PIT AND QUARRY

AUG 16 1938
PERIODICAL DIVISION

MARCH, 1938

CONVENTION ISSUE

National Sand and Gravel Association
Concrete Industries . . . State Groups

WEDRON SILICA CO.

Increases Capacity–Reduces Power & Maintenance

Three pulsometers and a drag conveyor have been replaced by two 8" Hydroseal Sand Pumps in series at the Wedron Silica Co., Wedron, Illinois. In this pioneering installation of pumps, the silica sand is pumped 1600 feet and against an elevation of 105 feet from the sump at the pump house, to the wash house on top of the hill. The plant capacity has been increased 16% per day due to the maintained, uniform capacity and discharge head of the Hydroseal Pumps. The low power consumption resulting from the unique Hydroseal Principle permits them to save $2.00 per hour under their former pumping costs. Maximix Rubber Pumping Parts (Impeller — Shell Liner — Side Plate Liners, etc.) have introduced decided savings in maintenance costs, and due to their longer service life, replacements are less frequently necessary . . . Address the nearest office listed at the right for a copy of our catalog No. 836 or any other information.

HYDROSEAL Sand PUMPS

ASH

HYDROSEAL AND MA
DESIGNS ARE COVE
PATENTS AND APPLIC
IN THE MAJOR MINING
OF THE WORLD AND
PURCHASED ONLY TH
THE FOL'OWING COMP

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The Allen-Sherman-Ho
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Field Bldg.

WILKES-BARRE
Power Engineering Co
517 Brooks Bldg.

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CANADA
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ENGLAND
The Ash Co. (London)
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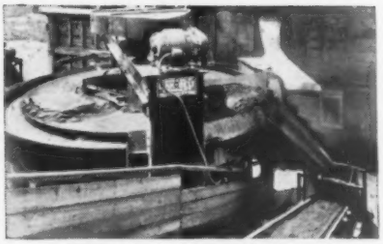
The Rock Products Industries Everywhere use

LINK-BELT CONVEYORS AND TRANSMISSION EQUIPMENT



Rotoscoop for recovery of fine sand

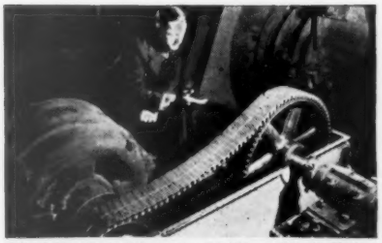
Belt Conveyor handling sand

● Producers of sand, stone, lime, gravel, gypsum cement and other non-metallic minerals have long known through actual use that Link-Belt cost-reducing mechanical handling equipment and driving machinery are durable, dependable, and economical, being built to last, and to operate at maximum efficiency. Send for General Catalog No. 700.

Link-Belt Company, Chicago, Philadelphia, Indianapolis, Atlanta, San Francisco, Toronto, or any of our other offices located in principal cities.

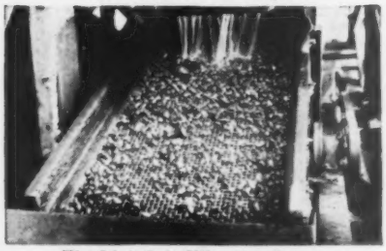
7184-D

Feeder and Belt Conveyor

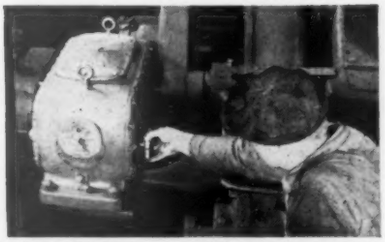


The Link-Belt Silverstreak Silent Chain Drive

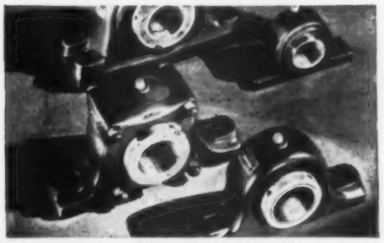
Self-Aligning Belt Conveyor Idler



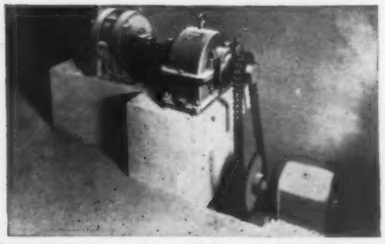
The Link-Belt Vibrating Screen



Link-Belt P.I.V. Gear variable speed transmission



Bearings, Collars, Hangers, Pulleys, Take-ups, etc.



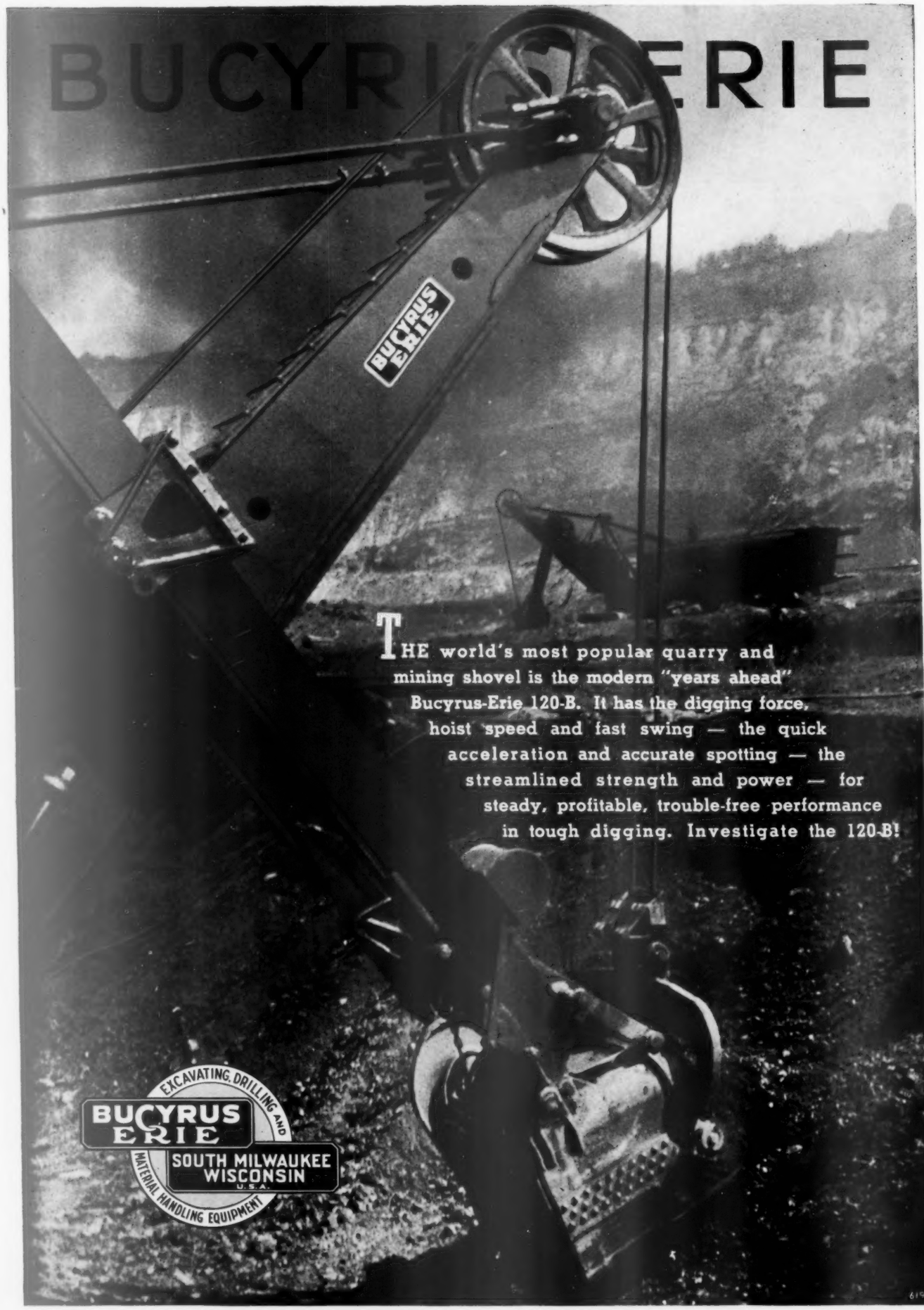
Speed Reducer and Chain Drive operating conveyor

Steel Apron Conveyor handling rock

Inclined Conical Screens

PIT AND QUARRY, March, 1938. Vol. 30, No. 9. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada and Central South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter February 28, 1932, at the Post-Office at Chicago, Ill., under the Act of March 3, 1897. Additional entry at Milwaukee, Wis.

T IN BINDING


BUCYRUS ERIE
THE world's most popular quarry and mining shovel is the modern "years ahead" Bucyrus-Erie 120-B. It has the digging force, hoist speed and fast swing — the quick acceleration and accurate spotting — the streamlined strength and power — for steady, profitable, trouble-free performance in tough digging. Investigate the 120-B!
BUCYRUS ERIE
EXCAVATING, DRILLING AND MATERIAL HANDLING EQUIPMENT
SOUTH MILWAUKEE WISCONSIN U.S.A.
619

Condor Air Hose in use at Norris Dam. Over 10,000 feet of Condor Air and Water Hose was used in the construction of Norris and Wheeler Dams.

Condor

a sign of real

HOSE

economy

TIME after time, the men who specify hose for heavy, rough service select Condor, confident that in doing so they put on the job a hose that measures up to their strict standards of performance.

Judged on performance, Condor Hose has earned a well-deserved reputation for dependability and long life. Designed to withstand extreme pressures and temperatures, abrasion, exposure and external abuses encountered in quarries, mines, mills and construction projects, Condor Hose lasts and lasts continually adding to operating efficiency and economy.

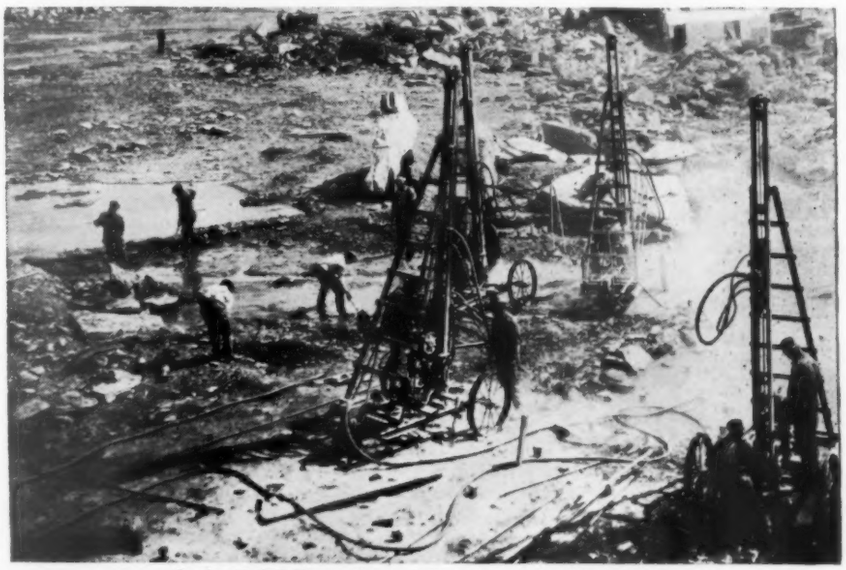
For air, water, steam, or suction service, specify Condor and get better hose performance at lower costs.

CONDOR AIR HOSE—For heavy rough service where hose is subjected to external abuse, irregular pressures, and hardships natural to drilling.

CONDOR WATER HOSE—Rugged, for general all-round use. Plies of heavy wrapped duck frictioned with tenacious long-aging rubber, and a strong live tube inside.

CONDOR STEAM HOSE—For continuous heavy-duty work. Resists heat and over-vulcanization for the longest possible time.

CONDOR SUCTION HOSE—For heavy-duty sand suction and dredging service. Withstands severe abrasion and rough handling.



Condor Air Drill Hose on Wagon Drills at large Hydro-Electric Project.

Condor PRODUCTS

Transmission Belt
V-Belt
Conveyor Belt
Air Hose
Contractors Hose
Sand Blast Hose
Suction Hose
Fire Hose
Hydraulic Hose
Steam Hose
Water Hose
Oil and Gasoline Hose
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Molded Rubber Goods
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THE MANHATTAN RUBBER MFG. DIVISION
OF RAYBESTOS-MANHATTAN, INC.
EXECUTIVE OFFICES AND FACTORIES, 11 TOWNSEND ST., PASSAIC, N. J.

DEMPSTER

Saves its cost in Economies

THE DEMPSTER-DUMPSTER is the one positive method of eliminating the high cost of hand loading. It is hailed by operators everywhere as the greatest advance in material handling equipment in years. It is a known fact that in some instances it has saved as much as 30% to 50% in quarry operations, road work and similar jobs.

THE DEMPSTER-DUMPSTER is rugged, yet simple — Compact, yet balanced.

DEMPSTER-DUMPSTER Containers are:
Detachable —
Self-Cleaning —
Automatic-Dumping —
One-Man Control —

The truck never waits for a load. The truck with the DEMPSTER-DUMPSTER Hoisting Unit, picks up a loaded container, hauls — dumps — and returns it, spots it at loading point and proceeds to pick up the next loaded container. One truck unit may serve from 4 to 10 detachable containers, depending upon the distance of the haul.

Increased Production — Decreased Expenses.

THE DEMPSTER-DUMPSTER is the modern, time-saving, profit producing method of loading, hauling and discharging materials.

View of Dempster - Dumpster in action.

Write for Bulletins today.

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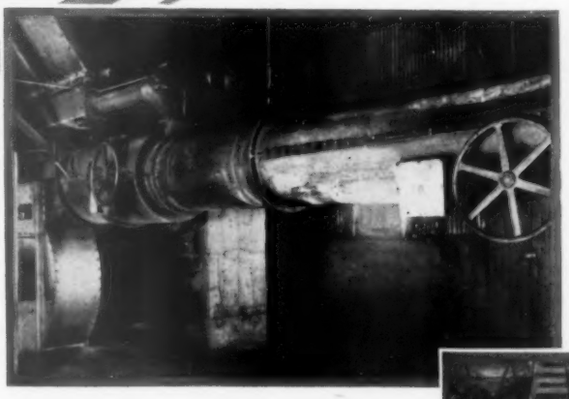
DEMPSTER BROTHERS, INC. KNOXVILLE, TENN.

DUMPSTER

TRAYLOR AT INKOM



Traylor Equipment at Inkom.
Traylor - Cheesman Double - Tube Burner for pulverized coal (upper photo).
8'0" to 9'0" x 48'0" Traylor-Cheesman Rotary.

Cooler (lower photo).
28" x 36" Traylor Bulldog Jaw Crusher
3'0" x 10'6" Traylor Cast Steel Heavy Duty Apron Feeder

Far-sighted management is ever alert to adopt new ideas that make for greater efficiency and economy of operation. So, quite naturally, when the progressive Idaho Portland Cement Company found it necessary to revamp the burning department at its Inkom, Idaho plant, there was only one logical choice of new equipment — The Traylor-Cheesman-Cooler-Burner System.

Comprising a Traylor-Cheesman Rotary Cooler and a Traylor-Cheesman Double-Tube Burner, connected with an existing Rotary Kiln, this installation well illustrates how old layouts may be modernized thoroughly by benefit of the indisputable advantages of the Traylor-Cheesman-Kiln-Cooler-Burner System.

Fuel costs in any plant using rotary kilns can be measurably reduced by the use of the Traylor-Cheesman-Kiln-Cooler-Burner System, because the gases recovered from the Cooler are used as preheated combustion air in the kiln.

There are other advantages, too, but, besides having insufficient space to enlarge on same in this advertisement, we'd rather have our technician tell you the story.

So, write today asking to have him around. Also, we'll be glad to send you our descriptive Bulletin 116, if you say so!

TRAYLOR ENGINEERING & MANUFACTURING CO.

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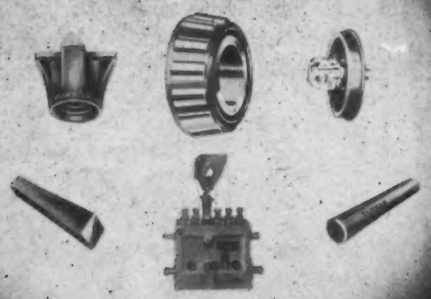
"TIMKEN"

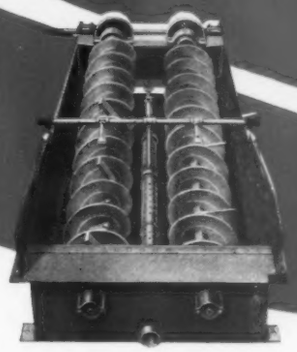
TRADE MARK REG. U.S. PAT. OFF.



A world-famous trade-mark identifying the products of one of the world's leading engineering-manufacturing institutions . . . TIMKEN Tapered Roller Bearings, TIMKEN Alloy Steels, TIMKEN Seamless Steel Tubing, TIMKEN Rock Bits and TIMKEN Fuel Injection Equipment for compression-ignition engines.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Another Booster!



Eagle "Swintek" Nozzle Ladder

....AND A REPEAT ORDER!

BEFORE ordering their second Eagle Swintek Ladder recently, the Bedford-Nugent Co., Evansville, Ind., wrote us as follows:

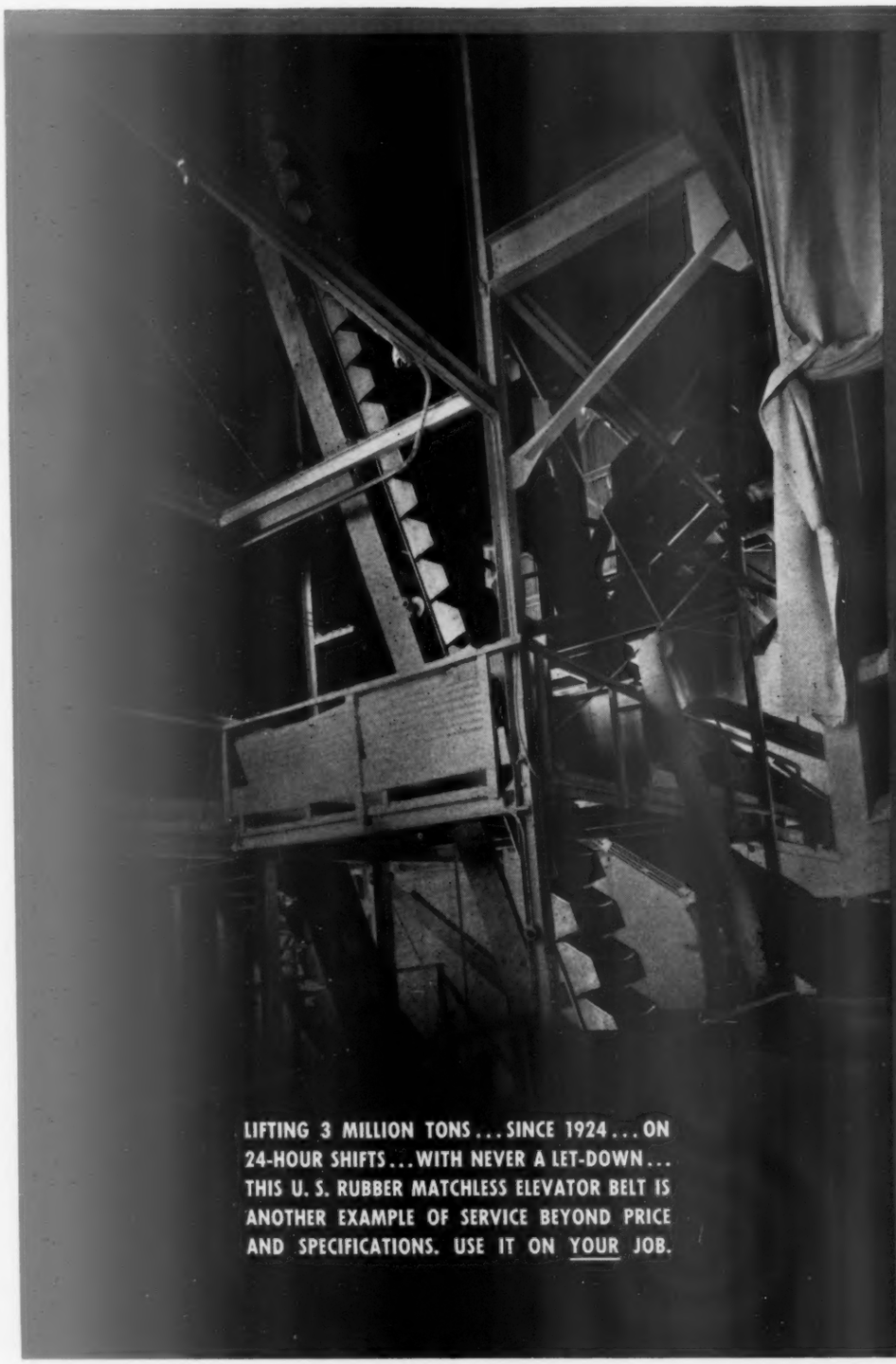
> ***"We have been operating one of your 12-inch 65-ft. Swintek Ladders since June, 1934 and are well pleased with its operation. We recommend this equipment to anyone with a pump operation that has a deposit which will not cave.***
> ***"Also wish to state that to date the cost of repairs has been very small."***

Operating an Eagle Swintek Ladder means full-time pumping, no clogged pipe-lines, oversize screened out and deposited out of the zone of operation, positive agitation, even flow of material, penetration of tightly packed or cemented strata, and a lower unit power cost through greater production.

Study the savings you might effect if your pump output were multiplied two or three times, as many Eagle Swintek operators have reported. Write for complete details. Our engineers will gladly work up a proposed Eagle Swintek application for your dredge.

EAGLE IRON WORKS Des Moines, Iowa

CONVEYING 600,000 TONS TEXAS GRAVEL—

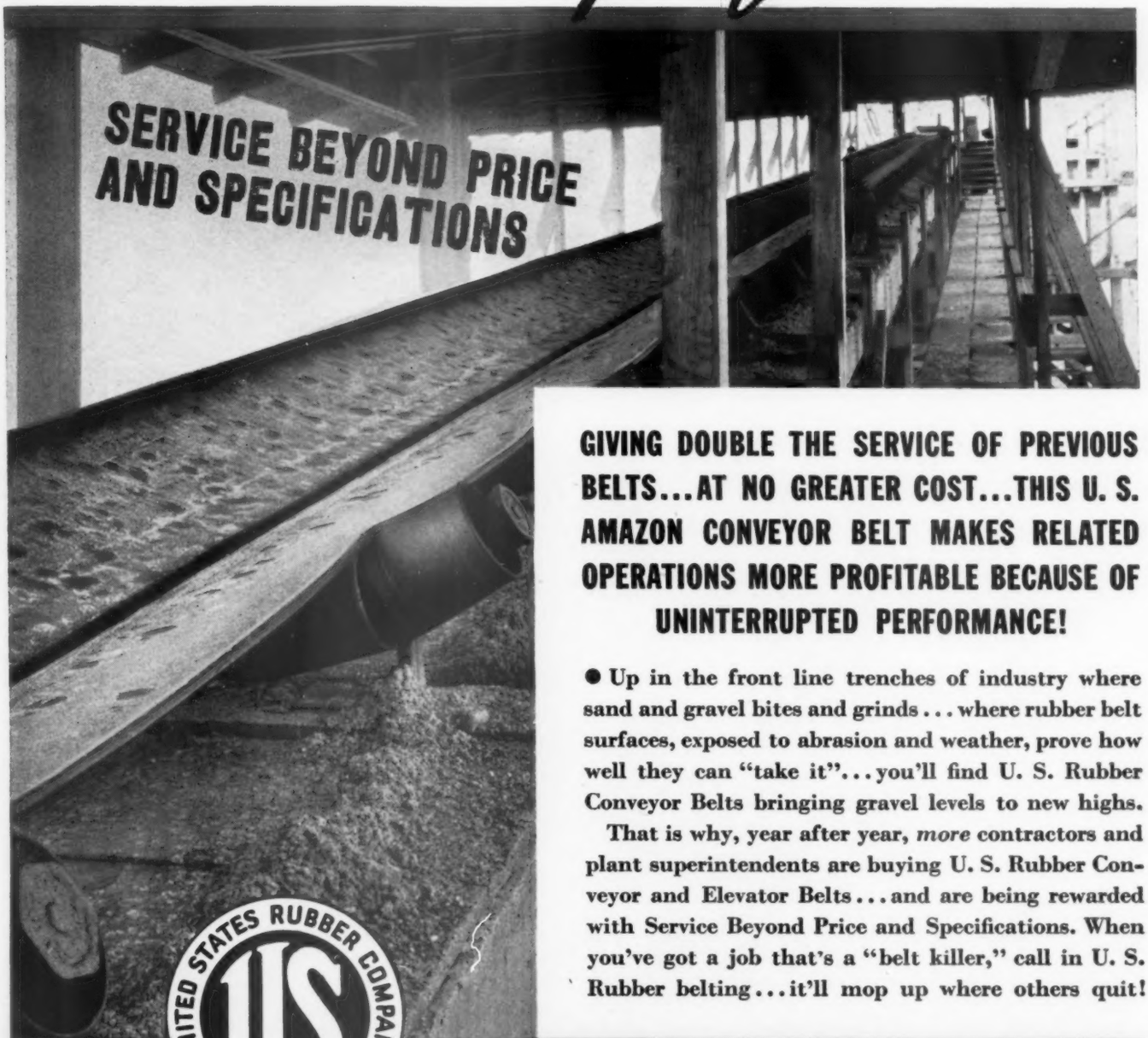


LIFTING 3 MILLION TONS... SINCE 1924... ON 24-HOUR SHIFTS... WITH NEVER A LET-DOWN... THIS U. S. RUBBER MATCHLESS ELEVATOR BELT IS ANOTHER EXAMPLE OF SERVICE BEYOND PRICE AND SPECIFICATIONS. USE IT ON YOUR JOB.

Tune in on Ben Bernie—Columbia Broadcasting System Wednesday Evenings on the U. S. Rubber Royal Master Tire Program with an all star cast. 9:30 E. S. T., 8:30 C. S. T., 7:30 M. S. T., 6:30 P. S. T.

OF THE MOST ABRASIVE

With little sign of Wear!



GIVING DOUBLE THE SERVICE OF PREVIOUS BELTS...AT NO GREATER COST...THIS U. S. AMAZON CONVEYOR BELT MAKES RELATED OPERATIONS MORE PROFITABLE BECAUSE OF UNINTERRUPTED PERFORMANCE!

● Up in the front line trenches of industry where sand and gravel bites and grinds . . . where rubber belt surfaces, exposed to abrasion and weather, prove how well they can "take it"... you'll find U. S. Rubber Conveyor Belts bringing gravel levels to new highs.

That is why, year after year, *more* contractors and plant superintendents are buying U. S. Rubber Conveyor and Elevator Belts... and are being rewarded with Service Beyond Price and Specifications. When you've got a job that's a "belt killer," call in U. S. Rubber belting... it'll mop up where others quit!

UNITED STATES RUBBER COMPANY · US · TRADE MARK ·

United States Rubber Company

United States Rubber Products, Inc., New York, N. Y.

Order NOW
just off the press

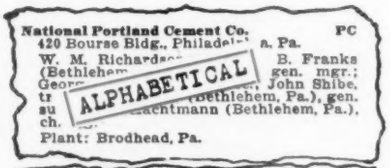
The 1938 Directory section of Pit and Quarry HANDBOOK is the most complete ever published. It is up to the minute—as modern as skill and money can make it. It's checked and double checked.

It gives you the names of the companies, their officers, the number and locations of plants, their capacities and equipment, and the names of the men who buy.

The technical section gives the latest production methods and practices. And there are consolidated catalogs of equipment.

It's Alphabetical

By Company Names →



It's Geographical

By Plant Locations →

BRODHEAD Northampton
(P. O. Bethlehem.)
National Portland Cement Co. PC
Branch of Philadelphia, Pa.
Plant Executives: H. vendel, supt.;
A. P. Hachtmann . Franks, v.-
pres., gen. ipment.
Pro capacity: Portland
ce
Na Deposit: Limestone. Stripping: Shovel. Drilling and Blasting: Blast hole drills. Digging and Loading: 2 P. & H. 2-cu. yd. electric shovels. Delivery to
GEOGRAPHICAL

Hundreds of New Listings . . . Others Checked for Accuracy

The 31st edition of the Handbook now ready will be of greatest benefit to those who order promptly and receive their copy immediately. Use coupon below. Select either the complete Handbook *and* Directory, or the convenient Directory alone in smaller, flexible binding, more convenient for salesmen. The price is the same in either case.

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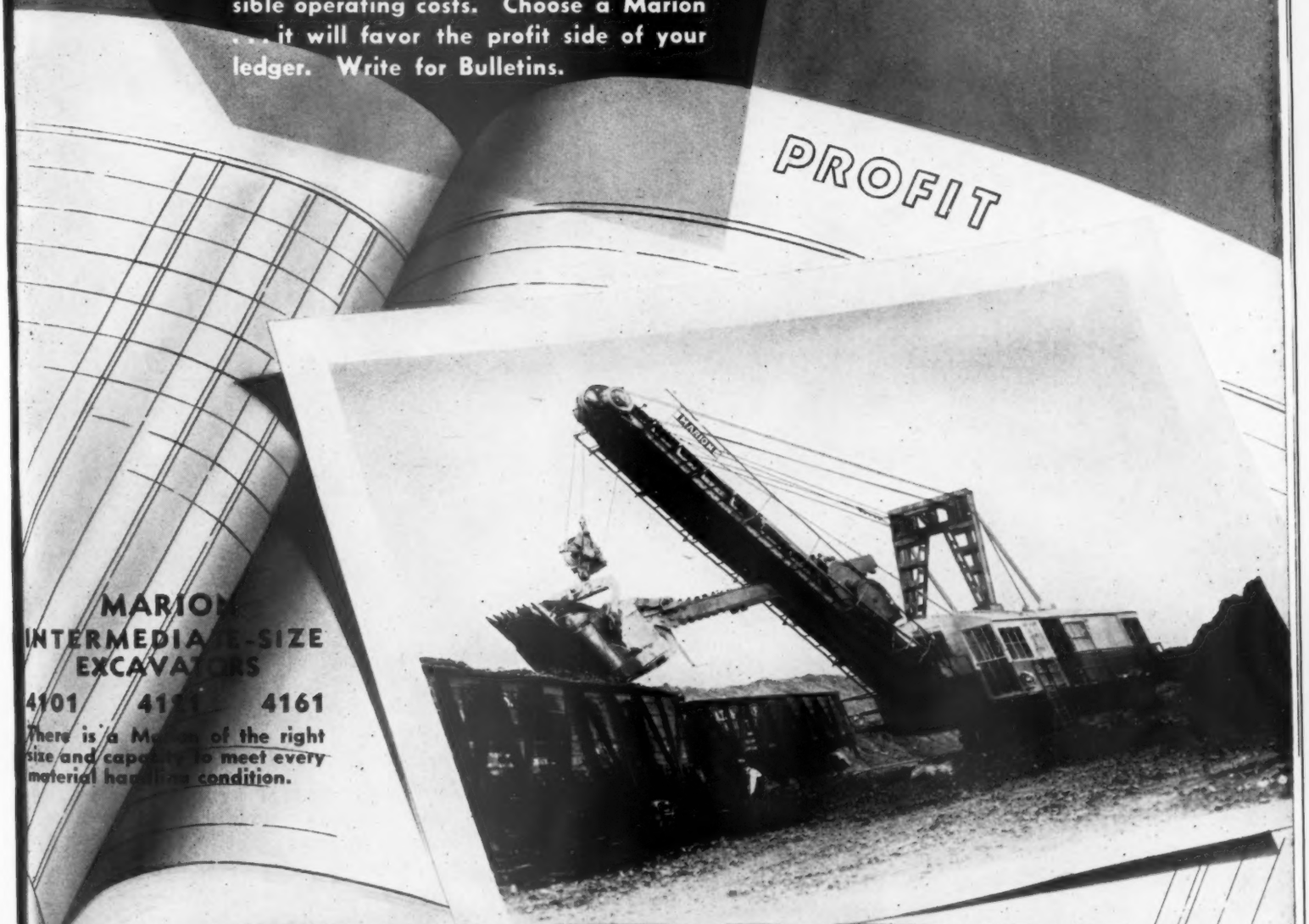
Name ..... Title .....

Company .....

Town ..... State .....

A SHOVEL THAT FAVORS THE *Profit* SIDE OF THE LEDGER

The right shovel has a decided influence in reducing material handling costs . . . and inducing a wider margin of profit. Marion's Intermediate size excavators have the universal reputation of delivering maximum yardage at the lowest possible operating costs. Choose a Marion . . . it will favor the profit side of your ledger. Write for Bulletins.



MARION
INTERMEDIATE-SIZE EXCAVATORS
4101 4161
There is a Marion of the right size and capacity to meet every material handling condition.

MARION

STEAM SHOVEL COMPANY • MARION, OHIO

A SHORT CUT

. . . To Lower Gravel Costs

On the Gila River project near Yuma, Arizona, Contractor Geo. Pollock of Sacramento, California has adopted a unique—yet job proved—method of producing gravel for concrete going into the canal and siphon. LeTourneau equipment does everything but wash and screen the material. This is how his simple, money-saving operation works. . . . .

A LeTourneau 12-Yard Carryall Scraper works in the borrow pit, digging and loading gravel . . . then transports its own load to the washing and screening plant where it is dumped on the elevator. A second LeTourneau Carryall Scraper picks up the gravel discharged from the plant and hauls it to stock piles where it is spread to suit the needs. Just to complete the job of cutting costs, a third "Caterpillar" tractor operates a LeTourneau Bulldozer to keep stock piles squared up.

Prior to this operation, scores of progressive firms had used LeTourneau Carryall Scrapers in the borrow pits for digging, loading and transporting gravel to the plant. This job, however, goes a step further and does away entirely with costly one-purpose systems . . . speeds output . . . places the finished product in neat stock piles, or takes it to the point of use on a minute's notice.

The dependable savings effected by LeTourneau equipment may be the solution to your production problems. We suggest you see your "Caterpillar" dealer for estimates, or a demonstration right on YOUR job.

R. G. LeTOURNEAU, INC.

LETOURNEAU

PEORIA, ILLINOIS STOCKTON, CALIFORNIA

Cable Address: "Bobletorno"

Manufacturers of: Angledozers*, Buggies*, Bulldozers, Carryall* Scrapers, Cranes, Drag Scrapers, Power Control Units, Rooters*, Treedozers.
* Name Registered U. S. Patent Office.

THE BIRTH OF A MODERN HIGHWAY

THE material for Wyoming's many miles of good roads comes from such State-owned plants as the one shown above.

"Caterpillar" Diesels power this entire job. Two "Caterpillar" track-type Tractors, pulling rotary scrapers, drag the rock from nearby pit to crusher and remove spoil. An 80-horsepower "Caterpillar" Diesel Engine drives a "Diamond" portable crushing plant. 350 to 400 tons of ⅛" to ⅝" gravel pour from conveyor per 8-hour day. And all this sturdy, tireless engine consumes is 2½ to 3 gallons of low-cost Diesel fuel per hour. *Saves ten dollars a day,* as compared to the cost of gasoline power formerly used. Added up, such savings amount to a sizable total in the course of a year. They enable power equipment to pay for itself in short order. Are you open to "show-me" facts and figures? Call in your nearest "Caterpillar" dealer—or write direct to us.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

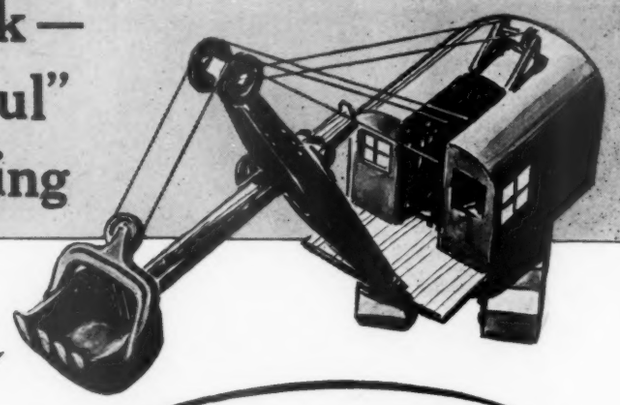
SEVEN ENGINE SIZES—44 TO 160 HORSEPOWER

CATERPILLAR DIESEL POWER

REG. U.S. PAT. OFF.

DIESEL ENGINES, TRACK-TYPE TRACTORS, ROAD MACHINERY

If Shovels Could Talk— they'd "say a mouthful" in favor of good blasting



I'M ALL TIRED OUT ...AND I ONLY HANDLED 36 CUBIC YARDS PER HOUR ALL DAY

BOY, I FEEL FIT AS A FIDDLE...AND MY DAY'S RATE OF PRODUCTION WAS 67 CUBIC YARDS PER HOUR

Consider the case of two 1-yard shovels—each with an average operating cost of $21.00 per hour for loading, hauling and dumping.

One, working with *well blasted rock*, showed an average production rate of 67 cubic yards per hour at a cost of only 31⅓c per yard.

The other, working with *poorly blasted rock*, handled only 36 cubic yards per hour at a cost of 58⅓c per yard.

What made the difference? Blasting! And—what makes blasting good or bad? The explosive!

ATLAS APEX offers the right strength, the right velocity, and the right fragmentation that means a full bucket at every bite of the shovel. Made in five grades—each with three velocities—it meets a wide variety of quarry blasting needs *with new economy!*

Ask the Atlas Representative to arrange an Apex demonstration in *your* quarry!

ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

Everything for Blasting

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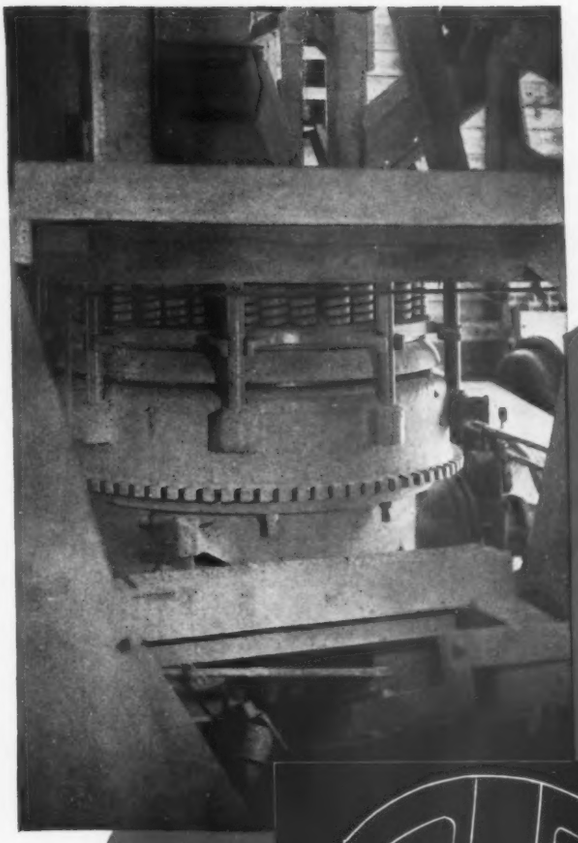
ATLAS

EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES



This 48 in. Telsmith Gyrasphere Crusher crushes ore to minus ¾ in. in the custom mill of the Cripple Creek Mining and Milling Co., Cripple Creek, Colorado.

The Only SECONDARY CRUSHER WITH THE Double Wedge CRUSHING ACTION

DOUBLE WEDGE ACTION

CHOKE FEED

The Gyrasphere takes an unregulated and unlimited choke feed. That means steady, reliable, economical, effective reduction capacity.

PISTON RING SEALS

Double protectors . . . four flexible leather labyrinth seals plus two piston rings . . . reduce both oil consumption and maintenance expense to a minimum never attained in any other crusher.

Working at choke feed, the Telsmith Gyrasphere Crusher not only turns out an enormous tonnage of more cubical aggregate, but crushes finer, with less trouble, less power, and less upkeep.

In the Gyrasphere, *two forces cooperate to produce the most effective breaking action ever developed in any crushing device.* The head is impelled both by the gyrated shaft and a rotary wedge action, produced by the supporting eccentric and roller thrust bearing. The bronze eccentric sleeves are relieved of most of the load—pressures being diverted downward to the massive roller thrust bearings which wear evenly and last indefinitely.

Write for Bulletin Y-15

SMITH ENGINEERING WORKS
504 E. CAPITOL DRIVE MILWAUKEE, WIS.

50 Church Street
New York City

211 W. Wacker Drive
Chicago, Ill.

713 Commercial Trust Bldg.
Philadelphia, Pa.

811 Binney Street
Cambridge, Mass.

412 Westinghouse Bldg.
Pittsburgh, Pa.

Brandeis M. & S. Co.
Louisville, Ky.

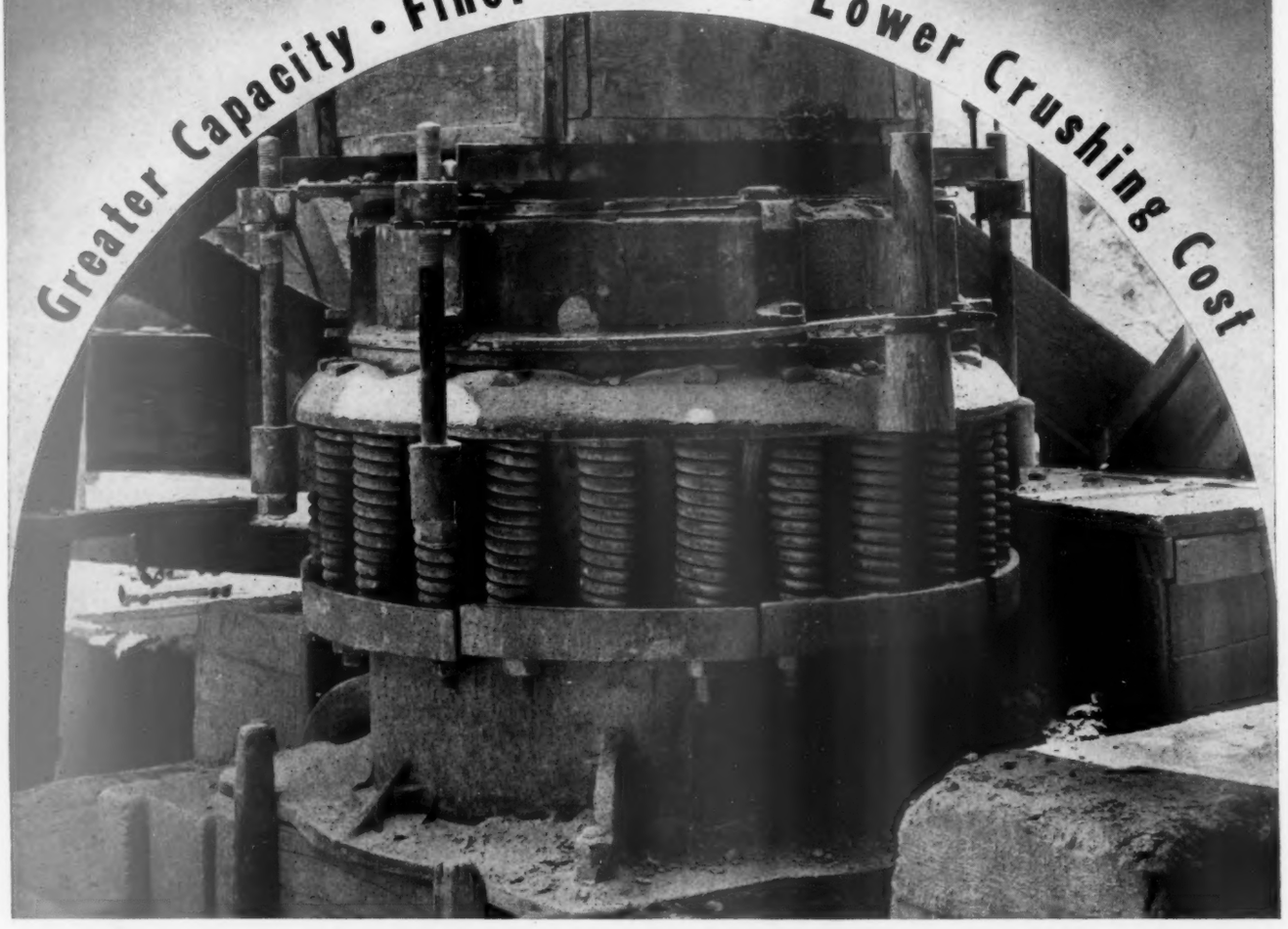
Associates in Canada: Canadian Vickers, Limited
Montreal and Vancouver

YC-11-38

TELSMITH GYRASPHERE

first Among Reduction Crushers

Greater Capacity • Finer Product • Lower Crushing Cost



The predominance of Symons Cones

among plants producing finely crushed materials in quantity, definitely stamps them first in the reduction crusher field. Because of a unique process of crushing, Symons Cones make possible a greater capacity of fine product and at a substantial reduction in crushing cost.

Meet today's demands for finer crushed and better materials with Symons Cones. They will help toward more profitable operation also. There is a size for plants large and small and a type that makes just the kind of product desired. Join with the many who have installed Symons Cones and have solved their reduction crushing problems.

NORDBERG MFG. CO. MILWAUKEE WISCONSIN

New York City
60 E. 42nd St.

Los Angeles
Subway Terminal Bldg.

Toronto
Concourse Bldg.

London
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SYMONS CONE CRUSHERS

Outstanding Advantages from BOOM to ENGINE

Built in a range of 18 SIZES 3/8 yd. capacity and Larger

. . . Northwest Welded Shovel Boom and Dipper Sticks.

. . . Northwest Alloy Steel Dragline Boom.

. . . Northwest Cushion-Clutch.

. . . Northwest "feather-touch" Clutch Control.

. . . Helical Engine Reduction Gears. Enclosed and running in oil.

. . . Ball or Roller Bearings on all High Speed Shafts.

. . . Uniform Pressure Swing Clutches.

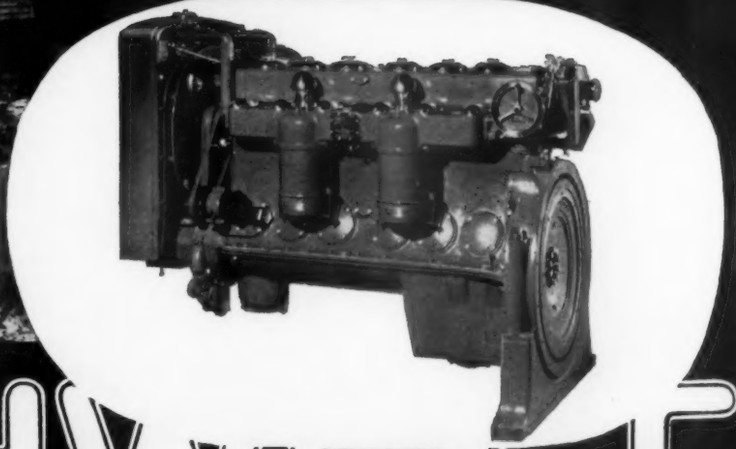
. . . Northwest Mobility — power on both crawlers at all times.

. . . Northwest Independent Crowd — simple — direct — powerful.

. . . Northwest simplicity of design and construction — low cost upkeep.

NORTHWEST ENGINEERING CO.
1727 Steger Building
28 East Jackson Boulevard
Chicago, Illinois

These two Northwests are powered with Murphy Diesel Engines.



NORTHWEST

Continentals are Gluttons for Work—

they get out sand at a lower cost!

Continentals are plenty handy around a sand pit — they strip overburden, build loading ramps, dig and haul sand, and load trucks — and they do this job single-handed, without shovels, draglines or other loaders, and, of course, with greater economy.

Our sales engineers hear it every day, "Continental Wagon Scrapers are gluttons for work!" The reasons are apparent — no "excess baggage" in Continental construction; strong, yet light, metal body, and simple hydraulic operating mechanism provide for easier handling, faster digging, bigger loads, and speedier dumping.

They dig anything the tractor can pull through: rocks, gumbo, imbedded roots — in cuts from a foot thick to wafer-thin. They dig and load as they haul, and they back dump like a truck. Truck loading is just one of the jobs they do. Backfilling, stock piling, windrowing, leveling, grading — they're all simple with Continentals, and you can't beat them for low cost operation.

Made in 4, 5, 7 or 10 yd. sizes with balloon-tired wheels or crawler mounted.

Ask your Allis-Chalmers Dealer to show you how Continentals can save for you!

& other Features!

1. Lightest in weight, yet strongest!
2. Simplest in design and all working actions!
3. Require less tractor power!
4. Back dump like a truck!
5. Dump in close quarters!
6. Turn short and back easily!
7. Load, dump and haul faster!
8. Used for spreading and grading, too!

CONTINENTAL ROLL & STEEL FOUNDRY CO.
Tractor Equipment Division
14400 Railroad Avenue EAST CHICAGO, INDIANA

SUPERIOR ROAD MAKING MACHINERY

LIMA

EXCAVATORS
ARE BUILT
TO CONQUER
TOUGH ASSIGNMENTS

Efficient low cost operation is desired by every user of shovels, draglines, cranes or clamshells; that is why so many users are switching to LIMA, the most modern excavator on the market today.

LIMA LOCOMOTIVE WORKS, INC.
Shovel and Crane Division, LIMA, OHIO, U.S.A.

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NEWARK, N. J. 317 Frelinghuysen Ave.
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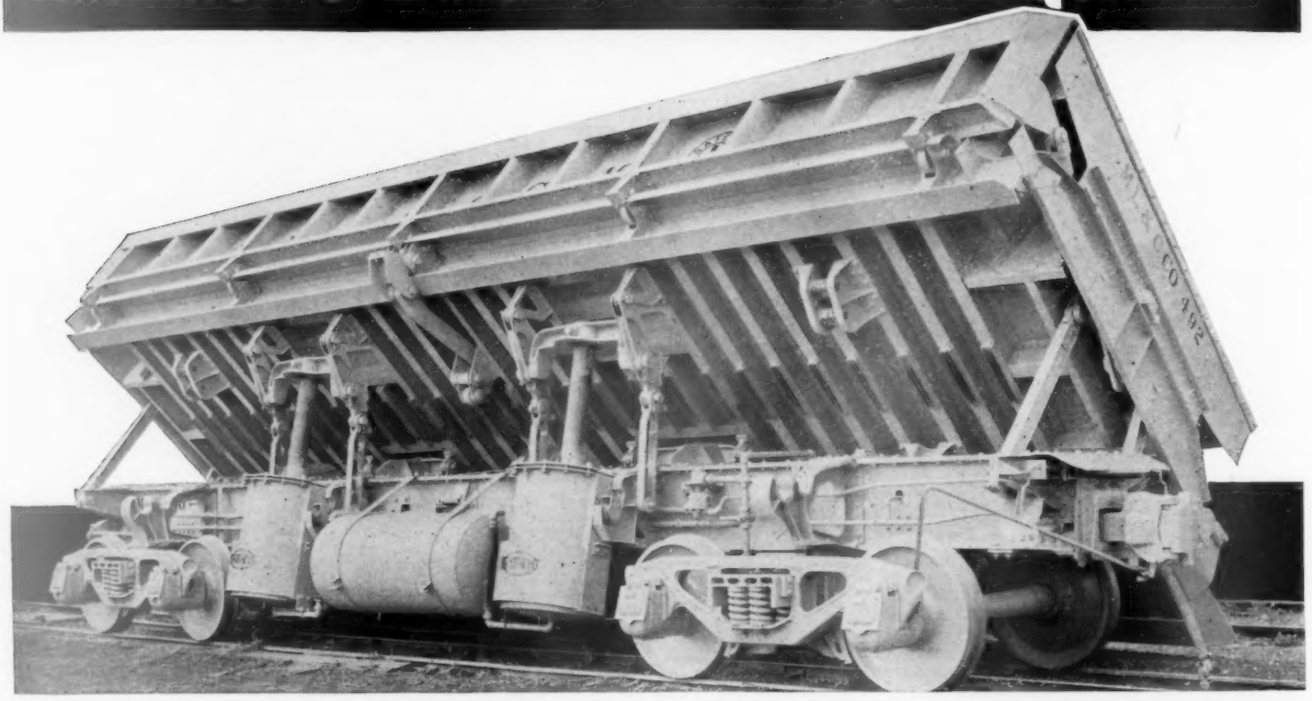
SEATTLE 1932 First Ave South

General Supply Co. of Canada, Ltd., Ottawa, Ont.
Tyee Machinery Company, Vancouver, B. C.

SHOVELS-DRAGLINES LIMA CLAMSHELLS-CRANES

15 "Western" 36-yard Cars for AMERICA'S LARGEST LIMESTONE QUARRY



THE MICHIGAN LIMESTONE AND CHEMICAL COMPANY EFFECT NEW OPERATING ECONOMIES THROUGH SAVINGS IN WEIGHT — IMPROVED DESIGN

EXTRA STRENGTH... due to weight saving tough alloy steels... give these new 36-yard water level cars the highest ratio of pay load to dead weight. With unlimited clearance due to drop door construction the largest pieces or chunks are easily dumped to either side, the doors acting as aprons to deposit the materials well away from the track.

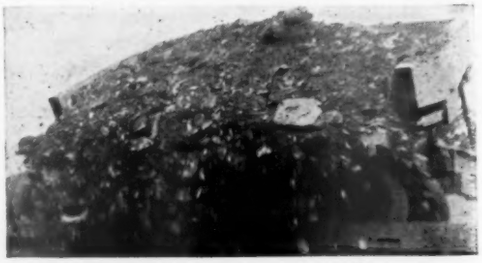
"Western" side dump cars use less air than all other makes because their superior design requires less lifting effort. The simplicity of the large diameter single stroke cylinders assure long life at practically no maintenance expense.

The 50° dumping angle, the seamless floor and smooth discharge surfaces assure fast, complete dumping of any type mine or quarry material. They comply with the latest American Association of Railroads, and Interstate Commerce Commission recommended car practices, and are acceptable for interchange revenue service under load.

Austin-Western are leaders in the development of on and off track haulage equipment. More than 60 years of successful experience in designing and building this type of machinery have qualified us to supply your requirements exactly. Ask us to figure your haulage requirements.

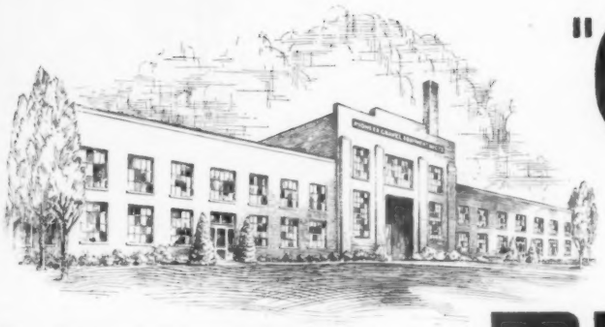
THE AUSTIN-WESTERN ROAD MACHINERY CO.
1841 Barrows Street, Aurora, Ill. Cable Address AWCO, Aurora, U.S.A.

These new cars have a welded bed underframe with a continuous steel floor plate welded to the bed underframe.



Rubber tired semi-trailers for motor truck haulage. A-W light weight heavy duty pneumatic tired trail cars have proved their economy in open pit mines throughout the country—used with truck tractors and track type crawler tractors, end, bottom, or two-way side dump.

Austin-Western



"Crack 'em down" with PIONEER SUPER 40 ROLL CRUSHER

JAW CRUSHERS

ROLL CRUSHERS

HORIZONTAL SCREENS

VIBRATING SCREENS

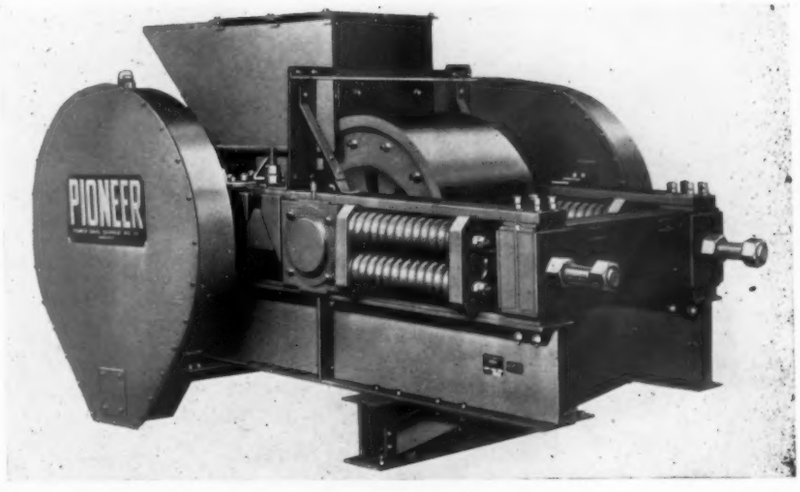
REVOLVING SCREENS

BELT CONVEYORS

ROCK PLANTS

WASHING PLANTS

Write for Bulletins of Gravel, Quarry and Mining Equipment.



SUPER-FORTY is built to lick today's toughest crushing jobs . . . to meet the new specifications for finer and more uniform materials . . . to give the higher efficiency and lower operating and maintenance costs necessary for beating the big push-up in production costs. Mechanically and structurally, it is the latest development in roll crushers . . . the result of years of accumulated experience of an engineering firm which has pioneered crushing equipment. Super-Forty is the "last word" in design, and the FIRST CHOICE of producers who KNOW crushers.

Check the features of the Super-Forty against any other machine on the market: Roll Shell Mounting, self-centering type, to prevent any shifting . . . Spring Release, eight springs to hold the floating roll, insuring safety against damage from tramp iron, and choking . . . Easy adjustment of roll for various size products . . . Star Gears to transmit power to floating roll . . . Countershaft Pinion and Drive Gear for driving gear on stationary roll, a feature that permits 6½ to 1 reduction. Write for list of crusher sizes.

PIONEER ENGINEERING WORKS

Mfrs. of Gravel, Quarry and Mining Equipment

1517 Central Avenue MINNEAPOLIS, MINNESOTA

Reports from

PRODUCERS show big increases 50% to 100%

Greater Output with RAYMOND

WHIZZER-TYPE ROLLER MILL

LIMESTONE—Two Roller Mills with whizzer separators are producing 32% higher tonnage than the three former mills, and at a saving of ⅓ in power costs.

●

SULPHUR—Whizzer-type Roller Mill equipped with CO_2 gas supply and cooling unit is grinding the product to 99% passing 325-mesh at an average output of 6000 pounds per hour. Results far exceed previous mill performance in extreme fineness and high capacity.

●

WHITING—Using a whizzer separator on Roller Mill, a capacity of 4000 pounds per hour of fine chalk whiting was obtained at a fineness of 99.7% passing 325-mesh, as compared to the former output of 1500 to 2000 pounds per hour.

Roller Mill with WHIZZER

With the development of the Whizzer Separator, protected by patents, the Raymond Roller Mill steps farther into the lead. In grinding the harder materials, it gives 25% to 50% higher capacities, and on softer materials the increase ranges up to 100%. It shows incredible savings in power and maintenance. Never before has industry been offered such an opportunity to reduce costs of production in making fine powdered materials. Be sure to investigate its possibilities for your product.

Write for Bulletin No. 28

50TH YEAR

RAYMOND PULVERIZER DIVISION

1321 North Branch Street, CHICAGO

COMBUSTION ENGINEERING COMPANY, INC.

Offices in Principal Cities • Canada: Combustion Engineering Corp., Ltd., Montreal

Wise Old Uncle Sam!

● Along the southern border of our State of California there is being rapidly brought to completion the largest irrigation canal, in point of flow per second, ever constructed anywhere in the world, six times as large as any other in the United States. Carefully avoiding future international complications, the United States is wisely building the All American Canal entirely on American soil—every foot of this great channel is on our own side of the line fence. To do this necessitated cutting through high, rocky ground at four principal points, the excavation of greatest yardage being the now famous Pilot Knob Cut.

● On all this rock excavation work, the contractors showed themselves to be as wise as Uncle Sam — they chose the right equipment for so important a job. Six out of the seven drill rigs used are Clevelands, and selection was made only after prolonged tests.

● Let the decision of these contractors guide and help you in the selection of rock drilling equipment for your own jobs. They are the most important in the world—TO YOU. Bulletins 109 and 111 sent on request.

● The cut in which this picture was taken necessitated the removal of nearly 60,000 cubic yards of hard rock. Two Cleveland Rigs did all the primary drilling.

BRANCH OFFICES

El Paso, Texas
1417 Texas Street

Birmingham, Ala.
1304-6 N. First Ave.

Butte, Montana
41 East Broadway

Los Angeles, Calif.
2001 Santa Fe Ave.

Negaunee, Michigan
222 Heath Street

Newton, Mass.
457 Washington St.

New York, N. Y.
200 Church Street

Richmond, Virginia
12 North 15th St.

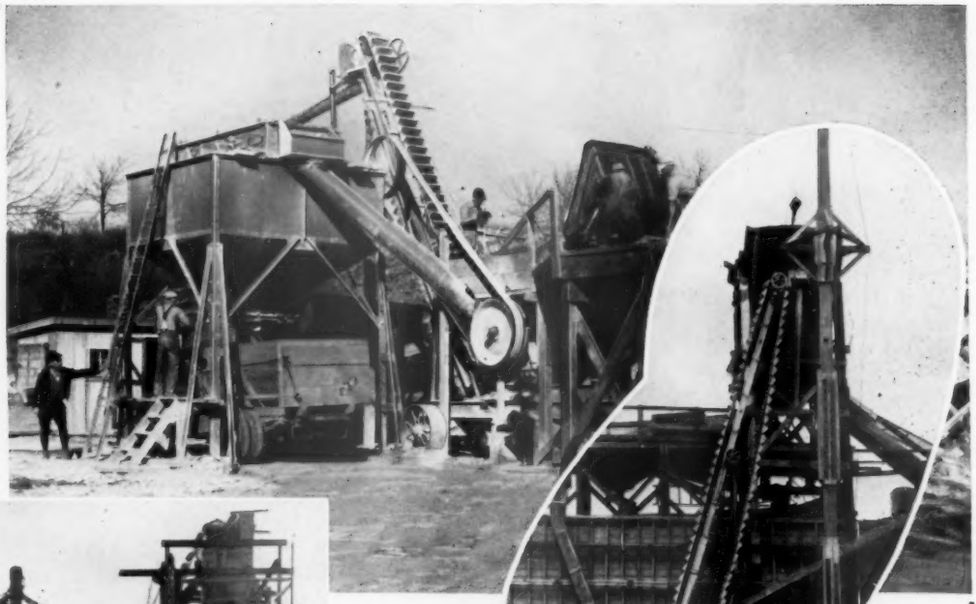
THE CLEVELAND ROCK DRILL COMPANY

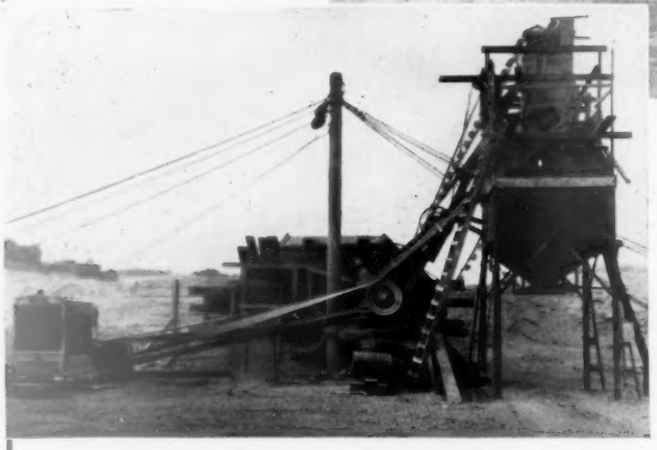
3734 EAST 78TH STREET • CLEVELAND, OHIO

Cable Address: ROCKDRILL

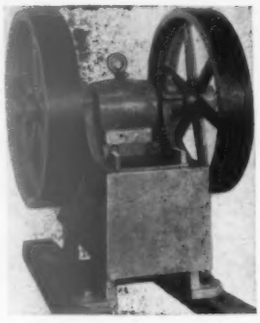
LEADERS IN DRILLING EQUIPMENT

For Any Tonnage—





UNIVERSALS ARE BEST!



32 Years Ago

Universal put out the first overhead eccentric jaw crusher ever built in the United States. That was in 1906, and Universal engineers have always been a step ahead since then — you get design refinements on Universals TODAY that will be copied and become standard practice in years to come. In buying crushing equipment, get the most for your money — get Universals and benefit from the experience of experts.

Whether your production demands are for carloads or truckloads of crushed rock, Universal Crushers will give you the greatest tonnages at the lowest operating cost. Over 32 years devoted exclusively to the design and manufacture of crushers and crushing plants have given Universal engineers a knowledge of operating and field conditions which has enabled them to be a step ahead with improvements.

Just compare Universal's double-action pitman that delivers two crushing blows with each revolution; its simple, positive product size adjustment; the use of more and larger roller bearings; the secure mounting on the rugged base; and other detail refinements in their construction that provide for extra years of trouble-free service.

Universal Crushers are available in 22 sizes with bronze bearings and 9 sizes with roller bearings—a size and type for every crushing requirement. Investigate the new 1938 Model 1016 "Streamlined" Jaw Crusher with the lighter, stronger base! For greater profits and better crushed products, tie-up with Universal in 1938.

Send for these bulletins: Bronze Bearing Jaw Crushers, No. 100; Roller Bearing Jaw Crushers, No. 200; Roll Crushers, No. 300; 1938 Model 1016, No. 4-A.

UNIVERSAL CRUSHER COMPANY

619 C Avenue West CEDAR RAPIDS, IOWA

UNIVERSAL

GIANTS
and just as *tough!*

QUAKER CONVEYOR BELTS

These two Quaker Conveyor Belts, each one weighing over six tons . . . 825 feet of 42 inch and 980 feet of 36 inch . . . are giants in the field of belting and just as tough as a Rhino's hide. They are on their way to move tons of material economically for their owners. Wherever sand and gravel is being moved you will find Quaker Conveyor Belts. Actual experience has proven time and time again that Quaker Belts make "lower cost per ton" possible.

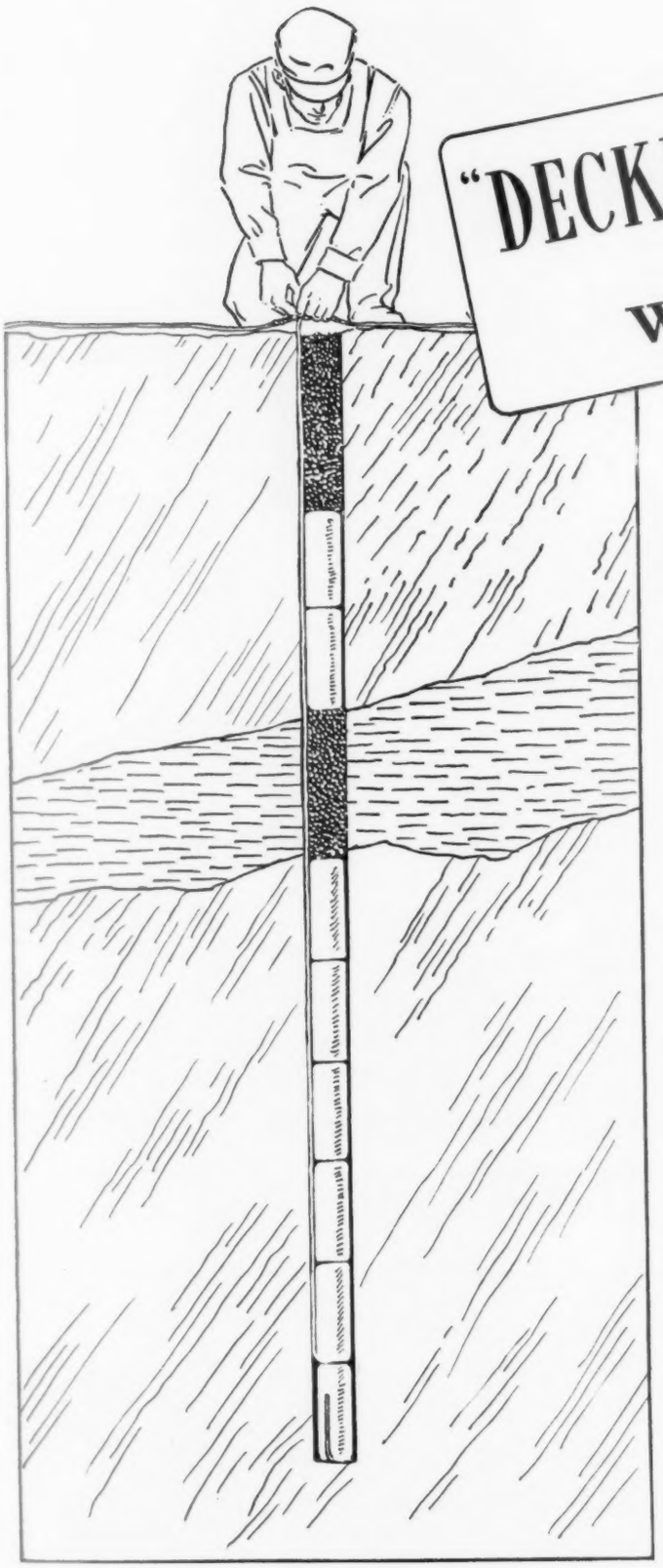
It will profit you to let us figure on your next belting job. Our belt experts are at your service. Call the Quaker man for information and samples.

QUAKER CITY RUBBER CO. PHILADELPHIA, PA.

QUAKER CITY RUBBER COMPANY

OVER 50 YEARS OF CONSISTENT QUALITY

PHILADELPHIA · NEW YORK · CHICAGO · SAN FRANCISCO



"DECKLOADS" are simpler with CORDEAU

EASY as filling your pipe—that's how simple it is to use Cordeau-Bickford Detonating Fuse in "deck loads." When the first cartridge has been lowered to the bottom of the hole, the Cordeau should be drawn closely against one side to protect it from injury. Then the rest of the cartridges and the tamping material can be set in place, the fuse making a direct contact with every cartridge and acting as an instantaneous detonator for each of the separate charges when the blast is fired.

This insensitive detonator is not only easy to use but also affords maximum effectiveness. Every cartridge has the added force of a primer cartridge, resulting in better fragmentation, quicker removal and other substantial economies.

THE ENSIGN-BICKFORD COMPANY
SIMSBURY - CONN.

CORDEAU·BICKFORD *Detonating Fuse*

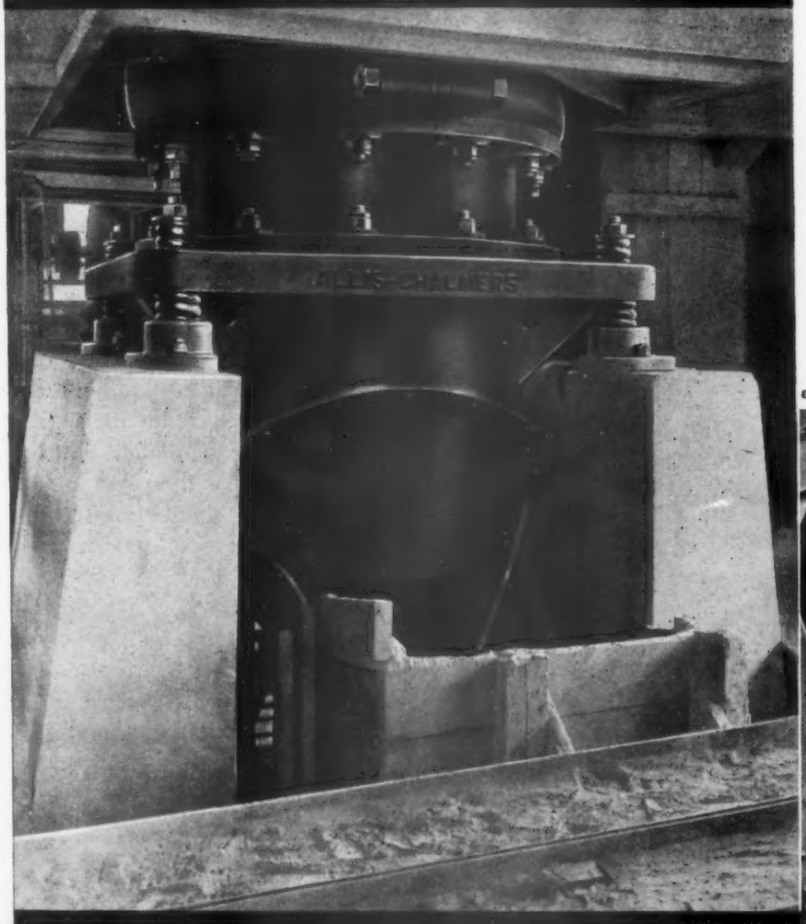
CB70

Flexible INSTALLATION

THE Newhouse is the one crusher that offers complete flexibility of installation. You can hang it from beams by means of cables or mount it on a concrete foundation with spring support, whichever works best for your plant.

OUTSTANDING FEATURES

1. Minimum number of working parts.
2. No gears and belts.
3. Minimum power requirements.
4. Large unobstructed feed opening.
5. Steep diaphragm, insuring free discharge.
6. Low oil consumption.
7. High ratio of reduction and uniform product.
8. Reversible non-choking concaves.
9. Self-contained with discharge spout, allowing crushed material to be fed direct to elevator or conveyor without additional hopper or chute. For discharging directly into bins or onto conveyor crusher can be supplied with welded steel bottom shell eliminating diaphragm and spout.
10. Large capacity.
11. Low installation cost.
12. Accessibility of moving parts.



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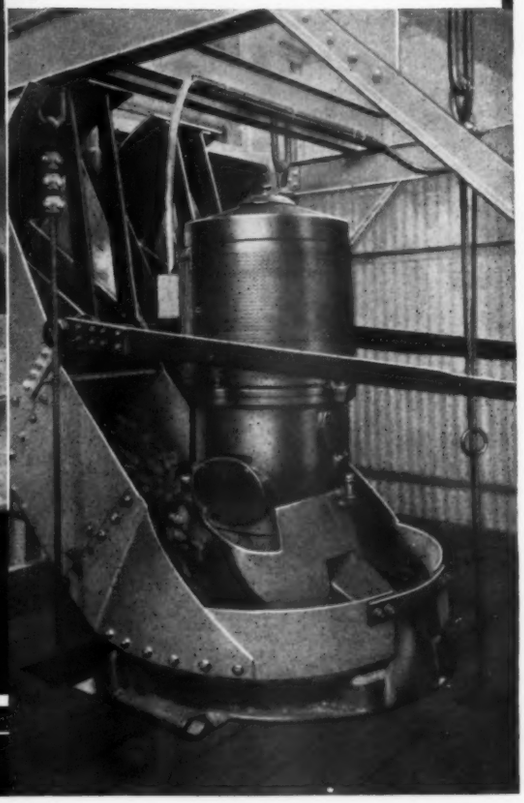


EQUIPMENT ENGINEERS TO INDUSTRY

ALLIS • CHALMERS

MILWAUKEE WISCONSIN

TRUE TO SPECIFICATIONS

LORAIN GRINDING BALLS *are regularly checked by the Brinell test for hardness. This is to assure long wear and uniform grinding action.*

OTHER LORAIN PRODUCTS Mill Liners and Screens of High Carbon Rolled Plate, Manganese, Chrome Nickel, Chrome Nickel Molybdenum, and plain Carbon Steel or Hard Iron; Hammers for Swing Hammer Mills, Industrial Cars, and Trackwork.

UNIFORMITY and economy in grinding requires balls that are *hard*—to withstand long wear in the mill . . . *resilient*—to take fast-repeating blows without splintering . . . *uniform* — to assist in maintaining the uniformity of your product.

USS Lorain Grinding Balls stand up under the heavy punishment of grinding mills because they are made exactly to specifications determined by the rough service to which they are subjected.

All USS Lorain Grinding Balls are forged to accurate size from new steel which has been rolled to definite specifications. Control of heat-treating processes, necessary for correct hardness, is effected by precise timing of movement through the cooling elements, temperatures being charted and frequently checked.

Because uniform wear is so important to efficient grinding action in your mills, we make doubly sure that USS Lorain Grinding Balls will be of uniformly high quality. From each production, samples are carefully checked in our laboratories. Measurements are made with extreme accuracy. Each production must be *as specified* . . . each production must be top quality . . . each must pass rigid tests within close tolerances — all of which guarantees greatest grinding action and long life.

USS Lorain Grinding Balls are available in the following sizes: ½", ⅝", ¾", ⅞", 1", 1¼", 1½", 2", 2½", 3", 3½", 4", 4½", and 5".

U·S·S LORAIN GRINDING BALLS

CARNEGIE-ILLINOIS STEEL CORPORATION

Lorain Division *Johnstown, Pa.*

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

B&W Direct Firing System

Like ONE-POINT FUEL CONTROL of an Automobile

Adjustments to meet changing kiln requirements for uniformly burned clinker are made at one point—like the throttle control of an automobile.

Fuel economy is maintained automatically, at all loads, by the constant ratio of coal and air.

The automatic feeder control responds immediately to changes in the size, grindability, or moisture content of the coal.

Details are given in Bulletin C-10. Copy on request.

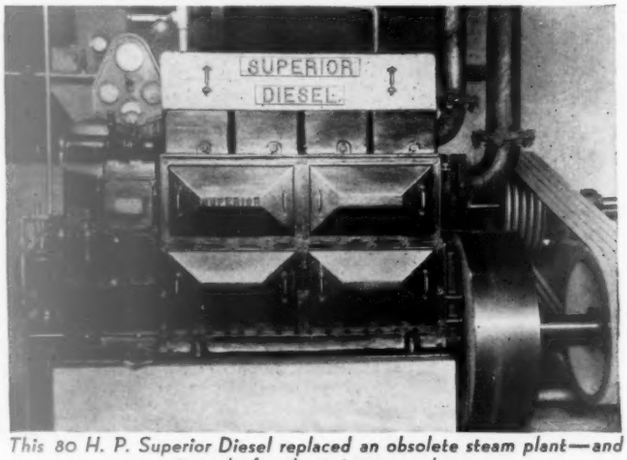
THE BABCOCK & WILCOX COMPANY. . . . 85 LIBERTY STREET . . . . NEW YORK, N. Y.

C-18

BABCOCK & WILCOX

SERVING and SAVING WHERE POWER LINES DO NOT GO

The Bowen Elevator Co., recently acquired by the New Paris Elevator Co., was completely remodeled and made one of the best-equipped, small country elevators in its locality.



This 80 H. P. Superior Diesel replaced an obsolete steam plant—and it works for about $1.75 per day.

Altho the demand for rural electrification is strong and both private and government capital are striving to meet that demand, it is needless to believe that the next 5 or 10 years will see more than a fraction of the rural homes and remotely located small power users supplied from transmission lines. There will always remain small isolated power users and mining and quarrying developments beyond economical reach of such power.

For such power users, Superior Diesels of all sizes are ready to serve—year after year—at a cost from a few cents to a few dollars a day.

Such was the case of the Bowen Elevator Company which had no power line to tap, but whose alert management realized that a Superior Diesel could be put in at once and still produce power for less than any probable rate when the power line might come.

Buy your Superior Diesel now! Your investment in it will be protected by its long life and economy years from now.

★ ★ ★

Superior DIESELS

HEAVY DUTY MODELS: 50 to 810 H.P., 250 to 720 R. P. M.

HIGH SPEED MODELS: 15 to 150 H.P., 900 to 1800 R. P. M.

THE NATIONAL SUPPLY COMPANY • SUPERIOR ENGINE DIVISION

FACTORIES: Springfield, Ohio; Philadelphia, Pa. • SALES OFFICES: Springfield, Ohio; Philadelphia, Pa.; New York, N. Y.; Los Angeles, Calif.; Houston, Texas.

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PIT AND QUARRY

Vol. 30 March 1938 No. 9

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CONTENTS

Editorial: Honesty in Business 33

News of the Industry 38

Technical Problems, Economic Topics Occupy Attention of Sand-and-Gravel Producers .. 40

2,000 Concrete Men Attend Gatherings in Chicago 66

Irving Warner Again Chosen to Head Lime-Putty Products Assn. 71

Pioneer Ready-Mix Producer Creates New Industry with Dry-Mixed Concrete in Bags 73

Curing Steam Generated Electrically at Tacoma Concrete-Products Plant 75

Precision-Made Concrete Units Prove Popular in Tucson, Ariz. 77

Uncovering Leads for Developing Potential Sales 78

Capacity Up 50% Since 1929 Opening 89
Men of the Industry 93
Personal Mention 94
Foreign Developments 96
Traffic News Digest 98
Occupational Diseases and the Law 100
New Machinery and Supplies 101

MEMBER AUDIT BUREAU OF CIRCULATIONS

low cost transportation

Robins economy lies far deeper than efficiency of conveyors. It includes the synchronous operation of the entire plant with its conveyors, feeders, elevators, screens and accessory equipment that Robins designs and builds to reduce the cost of handling bulk materials. Send for specific information based on your particular operation.

ROBINS CONVEYING BELT CO.
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Pennsylvania's New 44-Hour Law Loses

MADE INOPERATIVE BY COURT

Pennsylvania's new 44-hour week law, which became effective for workers in all fields of industry on Dec. 1, 1937, was made inoperative throughout the state Feb. 16 by an order of the Dauphin County court at Harrisburg. The court's injunction, which will be appealed immediately to the state supreme court, was granted on the plea of a Perry County business man who raised objections as a taxpayer to expenditure of state funds for enforcement of the law.

The court's ruling, made by Judge W. C. Sheely, prohibits Ralph M. Bashore, secretary of labor and industry, from attempting to penalize employers not complying with the law and also prohibits the state industrial board from spending any money under the law. It is possible that arguments before the state supreme court may be heard in March, making a high court ruling on the law's constitutionality possible by early spring. The county court's decision does not affect a 44-hour week law for women, which became operative last September.

The threat of official action, faced by many employers who delayed changing their work-week schedules pending a determination of the act's constitutionality, is removed by the ruling. Many employers, acting on advice of counsel, openly failed to comply with provisions of the law while it was the subject of court tests.

Some relief from drastic provisions of the law had been granted by the state industrial board through a modification that was applicable to quarrying industries. It applied to outside workers and provided that "employers may allow employees in or immediately connected with outside work to average 44 hours per week over a period of one calendar month and to work six days per week where weather and climatic conditions have caused interruption of regular employment." Exempt from all provisions of the law were *bona fide* executives receiving $25 a week or more.

The basic law limited work to eight hours a day and 5½ days a week.

Fire and Flood Damage Plants in California

Fire caused damage estimated at $40,000 a short time ago at the Mission Gorge plant of the Canyon Rock & Gravel Co. of San Diego, Cal. Another California plant, that operated on Butte Creek near Chico by the Johnson Rock & Gravel Co. also suffered damage recently when flood waters inundated the equipment.

Asks Federal Permit to Dredge in Mississippi

The Burlington Sand & Gravel Co., Burlington, Ia., has applied for a Federal permit to dredge the Mississippi for commercial purposes between Keokuk and Muscatine, Ia. According to government regulations dredging is not permitted within 100 ft. of the river banks or any dam, wing dam or bridge pier.

Idaho Plant Resumes After Adding Equipment

The plant of the Washington-Idaho Lime Products Co., Orofino, Ida., resumed operations March 1 after a complete general overhauling and the installation of considerable new equipment. The plant is now operating on a closed-shop basis under an agreement signed with the United Cement Workers' Union.

The California Portland Cement Co. of Los Angeles has been awarded two contracts totaling $394,004 by the Department of the Interior for cement to be used in building the All-American canal.

Truckers Win Right to Unload Concrete

ENGINEERS' UNION LOSES PLEA

A decision of vital importance to ready-mixed-concrete operators was handed down recently when John A. Lapp, referee, Building and Construction Trades Department of the American Federation of Labor, decided that the "unloading of ready-mixed concrete from trucks to a building or construction job, by means of machinery attached to the truck that removes the concrete from the bin of the truck, and the operation of the motor or piece of machinery used in unloading, is the work of the International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers of America."

The International Union of Operating Engineers had sought to have its members take over the work of unloading the trucks, basing its claim on a 30-year-old ruling that the engineers have jurisdiction over the motive power of cement mixers.

The matter was brought to a head by Mrs. Eva Crowe, head of Certified Concrete, Inc., East Chicago, Ind. She had informed the engineers' union that, as to those functions in her central-mixing plant which clearly involved engineers' duties, she was prepared to sign any reasonable contract with the union, but that she could not, if she wanted her company to survive, employ members of the engineers' union whose services were not needed. Her position was supported by the truckers' union, with whom she has had a contract for several months. The truckers claimed complete jurisdiction over the transportation and unloading of ready-mixed concrete, and gave witness to their position by driving trucks through a picket line thrown around the plant by the engineers.

The hearing before Dr. Lapp was held on Dec. 20 at Chicago.

Show Proves U. S. A. Is Highway Conscious

RECORDS FALL AT CLEVELAND

The thirty-fifth annual convention and road show of the American Road Builders' Assn. is now a matter of history. It is extremely interesting to observe that the United States is certainly highway conscious. The convention and road show broke all records established during the 35-year history of the association. The actual registration overwhelmingly surpassed the 24,000-mark set up in 1934. Representatives from every state in the Union and thirty-three foreign countries attended in large numbers. Exhibits of road-building machinery and materials worth $10,000,000 occupied 6½ acres of floor space in the huge Cleveland Public Auditorium. The exhibitors sold $4,000,000 worth of equipment during the show. The attendance, which totalled 75,000 during the six days of the show, helped to make this the biggest exposition of its kind ever held, according to Paul B. Reinhold, first vice-president of the American Road Builders' Assn.

A preview of the exhibits on the day before the show officially opened was attended by 4,000 of Cleveland's leading business men. Over 2,500 highway contractors—more than have attended any previous convention—came to the Cleveland conclave. Other groups with exceptionally large delegations included 6,000 manufacturing representatives and 3,300 distributors.

This group of more than 26,000 road builders, engineers, public officials, manufacturers and distributors gave careful consideration to and expressed themselves vigorously in favor of those principles which the American road builders' have had in their platform for many years. The outstanding principles of the American Road Builders' Assn. are: (1) the continuance of an adequate highway program to provide safety on all our highways; (2) the continuation of Federal-aid appropriations consistent with the excise taxes collected from the highway users; (3) the utilization of all highway revenues for highway purposes; (4) complete prohibition of the diversion of gasoline and other motor-vehicle tax money to non-highway projects; (5) the furtherance of its belief that all highway work should be conducted under the contract system.

Of the utmost importance to members of the association were the convention sessions devoted to the consideration of the question of Federal aid for highways. Speakers pointed out that our highway systems have been woefully inadequate to meet the demands of constantly-increasing traffic since 1925. It was stated by the highest authority that on the basis of the present program it will take at the very minimum *twenty years to bring our highways up to the demands of modern traffic.* In emphasizing the needs of a continuing program it was definitely shown that if all highway work were terminated as of 1937, practically our entire national system of highways would be definitely obsolete by 1960, at which time there will be in the neighborhood of 37,000,000 vehicles on our highways.

It was also definitely shown that the vast amount of direct and indirect employment afforded by highway work resulted in 75 to 90 per cent. of the highway dollar going into wages. It was also shown that one out of every seven tax dollars collected comes from the owners and drivers of motor vehicles. The Federal government has collected from these highway users $194,000,000 more than it has expended in the form of Federal aid for highway improvements.

Even with the continuance of Federal aid on the present basis the Federal treasury would still show a profit of upwards of $150,000,000 annually from the diversion of motorists' taxes. The American Road Builders' convention, therefore, went on record as being unalterably opposed to any reduction in Federal aid for highways and to any change in the procedure by which these funds are administered.

The equally vital problem of diversion of highway funds by state legislatures was also discussed. It was shown that this diversion annually reaches a grand total ranging from $165,000,000 to $200,000,000. In several states the practice of diversion has been outlawed by the adoption of constitutional amendments which prohibit the misuse of motor-vehicle revenues for any purpose other than the construction and maintenance of roads. Convention delegates pledged themselves to work for the passage of such an amendment in all the states where it has not already been accomplished.

Also of great significance to road builders were the reports of the Committee on Safe Highways. The means of reducing the startling number of deaths on our highways each year were discussed by the nation's leading safety experts. The elimination of grade crossings, blind intersections, slippery surfaces, steep grades, sharp curves, poorly-lighted and narrow roads was studied by this committee.

(Continued on page 92)

Public Construction Volume Increasing

OTHER GROUPS LESS ACTIVE

For the third month in succession, the volume of public construction exceeded the total for the preceding month. Contracts for public projects awarded during January, 1938 were 5 per cent. greater than in December, 1937 and almost 8 per cent. above the January, 1937 total, according to the F. W. Dodge Corp. Public construction for the current month amounted to $120,842,000.

Total construction contracts for both public and private work awarded during January in the 37 eastern states, amounted to $195,472,000. This compares with $209,452,000 for December and $242,719,000 for January of last year.

By classes of construction, the January contract total amounted to $36,207,000 for residential building, $57,448,000 for non-residential building, $53,366,000 for public works, and $48,451,000 for public utilities.

In addition to the increase in public construction, the volume of contemplated new work, particularly in the residential group, has shown continued improvement during the past two months. For January, total contemplated construction for all classes amounted to $474,205,000 as compared with $359,365,000 for the preceding month and $412,680,700 for January of last year.

Bradley Steamers Being Prepared for Season

A force of 70 workmen is busy renovating the fleet of steel freighters of the Bradley Transportation Co. preparatory to the opening of the navigation season in April. Six vessels are undergoing repairs, the work being done at the harbor at Cheboygan, Mich. The Bradley Transportation Co. is the lake-shipping subsidiary of the Michigan Limestone & Chemical Co., Rogers City, Mich.

To Use Concrete Bricks in Milwaukee School

The Riverside Dunbrik Co., of Thiensville, Wis., a suburb of Milwaukee, has received a contract for 550,000 bricks to be used in the construction of the new Pulaski High School in Milwaukee. This company has been making Dunbrik for the past two years and has developed a large market for its product.

Cites Edison's Part in Cement's Advance

HUGE TOWER IS DEDICATED

In connection with the dedication of the Edison Tower on Feb. 11 at Menlo Park, N. J., commemorative of the great inventor's achievement in producing the incandescent lamp and emblematic of other far-reaching inventions, Walter S. Mallory, a former business associate of Thomas A. Edison, a pioneer in the cement industry and past president of the Portland Cement Assn. relates important but little known contributions which Mr. Edison made to the cement industry.

"It is particularly fitting," Mr. Mallory says, "that the 118-ft. tower which supports a three-ton giant likeness of the first incandescent lamp is built of concrete, a material to which Mr. Edison so greatly contributed through advance in the technique of manufacturing cement.

"The tower itself, designed by Massena & duPont, architects, of Wilmington, Del., and built by Walter Kidde Constructors of New York, utilizes the achievement of John J. Earley, architectural sculptor of Washington, D. C., in giving surfaces beauty and color to structural concrete, a practice undreamed of thirty-five years ago when Thomas A. Edison entered the cement business.

"Prior to the attention given by Edison's inventive mind to the problems of cement manufacture, the industry was well established and growing rapidly. There were 65 plants in the United States which in 1901 produced some 12,000,000 bbl. of Portland cement. Last year 163 plants produced an estimated 113,000,000 bbl.

"Among the contributions made by Mr. Edison which undoubtedly have had a tremendous effect upon the industry, permitting greater capacities and larger production at lower cost, were the following:

"He was the first to employ the use of steam shovels in quarry operations producing the rock from which cement is made. Before that this work was done by hand and required that the rock be sized suitable for hand lifting.

"He was the first to adapt well-drilling equipment to the production of raw materials in quarries. This permitted large blasting operations and the movement of thousands of tons where prior methods of hand drilling and block quarrying limited production immensely.

"He was the first to use crushing rolls which allowed the handling of rocks in sizes of 10 tons instead of the 400- to 500-lb. rocks which could be taken by former crushers.

"In Mr. Edison's plant, completed in 1902, were built the first long kilns used in the industry. Enlarging rotary kilns of 60 to 80 ft. length to 150 ft. increased the capacity of each kiln about five times. Other manufacturers were skeptical of this giant machinery at first but since, the size of rotary kilns has increased until a maximum of over 400 ft. has been reached. Raw materials are burned at extremely high temperatures in these kilns to form the clinker from which the final cement is made.

"One of the final contributions made by Mr. Edison was finer grinding or pulverizing of cement which increased its plasticity and tensil strength thus broadening its use.

"Considering the thousands of uses to which cement and concrete are put today and the dependence placed by all people upon such construction in highways, bridges, buildings and miscellaneous structures, we are eternally grateful that Thomas Alva Edison's great talents were for a time applied to the improvement and advancement of this industry. Its success is also his."

New Products Firm to Operate at Columbus

The Atlas Concrete Block Corp. was granted a charter of the Ohio secretary of state Feb. 2 and has started production in a leased factory building at 420 S. Dana Ave., Columbus. The new firm will manufacture concrete block, slabs and will lay concrete floors, sidewalks and engage in similar activities.

Jack Kopperstein, architect and builder, is president of the firm, and I, M. Harris is secretary, treasurer and business manager. James Whitsell, well known in the concrete-block industry, has been named production superintendent. The vice-president has not been named.

Nat'l Gypsum Acquires Best Bros. Keene's Cement

The National Gypsum Co. announces the purchase of The Best Brothers Keene's Cement Co. Patents covering the manufacture of cement, paper fillers, and processing for certain industrial uses were acquired through the purchase. The Best plant is located near Medicine Lodge, Kansas. The purchase was made through an exchange of National's common stock for the capital stock of the cement company, the basis of which was not disclosed.

Quarrymen's Union to Demand Dust Control

NEW CLAUSE IS SUBMITTED

According to John C. Lawson, secretary of the Quarry Workers' International Union of North America, the organization has instructed all branches whose members are employed in the quarrying of silica-bearing rock to install dust-control equipment. Mr. Lawson says it is the intention of the union to carry on active work in this direction to combat the silicosis scourge. Granite quarries in the Barre district are coöperating wholeheartedly, Mr. Lawson reports. A copy of a new clause in its proposed contracts in that area is submitted by Mr. Lawson as follows:

To eliminate the silicosis hazard in rock drilling now existing the company agrees to install dust-control equipment which has been approved by the Industrial Board of the state of New York under the test procedure adopted by the New York Industrial Commissioner dated May, 1937 and published in Vol. 16, No. 5, of the *Industrial Bulletin* of the New York Department of Labor, and in accordance with the following definitions contained in the New York Department of Labor's Industrial Code, Bulletin No. 33, *Rules Relating to the Control of Silica Dust in Rock Drilling*, effective May 1, 1937:

"Rock drilling" shall mean drilling, cutting, chipping, channeling, broaching or crushing to excavate rock, by means of machinery or hand hammers.

"Silica-bearing rock" means any rock formation, natural or synthetic, containing as a component part, free silicon dioxide.

"Silica-bearing rock" shall be divided into two (2) classes:

Class I. Any rock formation of substantially uniform geological character having free silicon dioxide as a component part which is known from geological studies or otherwise can be shown by the applicant to the satisfaction of the Industrial Commissioner, to run uniformly less than ten (10) per cent. by weight, of the rock formation.

Class II. All rock formations, having free silicon dioxide as a component part, ten (10) per cent. or more by weight, and all other formation, natural and synthetic, having a variable and unpredictable content of free silicon dioxide.

"Injurious silica-dust concentration" shall mean dust produced from drilling silica-bearing rock which is in excess of the following values as determined by an approved dust-count method.

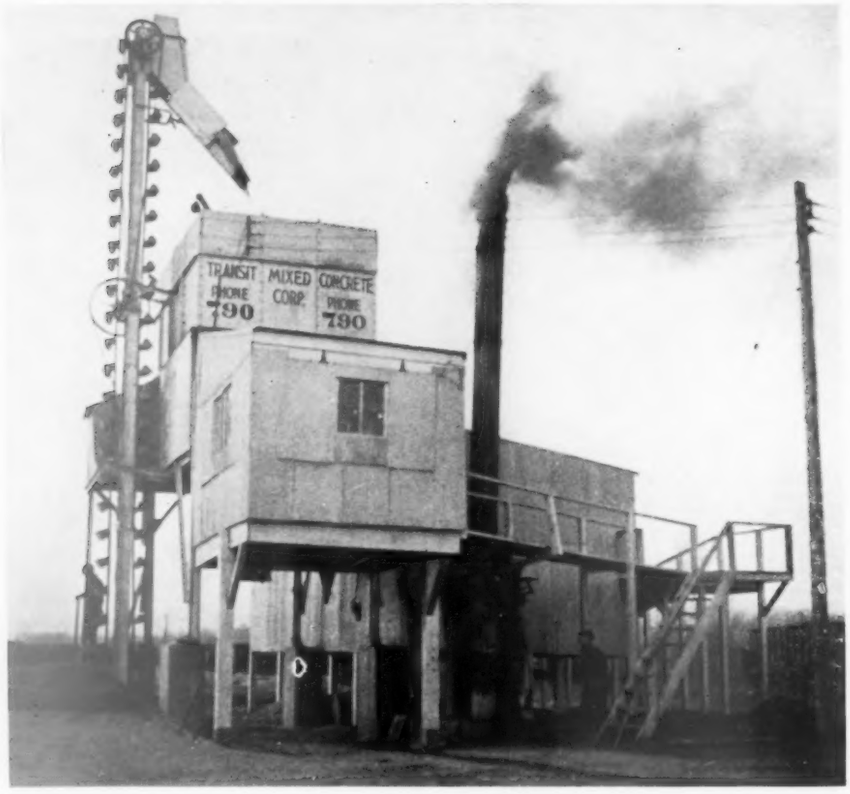
Class I. One hundred million (100,000,000) particles per cu. ft. of air.

Ten million (10,000,000) particles per cu. ft. of air.

All rock-drilling operations in silica-bearing rock shall be executed so that there will be no dissemination of injurious silica dust concentrations into the atmosphere.

Dust control equipment is to be installed on or before June 1, 1938.

This dust-control equipment shall at all times be maintained in efficient working order and in use and shall be inspected at regular intervals by the body which has been authorized to enforce Industrial Hygiene rules and regulations in the state in which this agreement is effective. A copy of this agreement shall be deposited with said body.



The batching plant of the Transit Mix Concrete Corp. of Logansport, Ind., which went into operation in September of last year. Four Chain-Belt truck-mixers are used to mix and deliver the concrete.

To Develop Fluorspar Deposits in Kentucky

Ball Bros. Co., Muncie, Ind., prominent manufacturer of glass fruit jars, recently purchased fluorspar properties in Crittenden County, Kentucky and will develop them in the future.

The Crittenden deposits were discovered early in 1937 by a group of boys who were playing in a cave on the property.

Monolith Midwest Gets Federal Cement Award

The Monolith Portland Midwest Co. of Los Angeles, Cal., has been awarded a contract for 210,000 bbl. of cement by the U. S. Bureau of Reclamation, according to press dispatches from Washington.

The contract was awarded on the firm's bid of $524,580. The cement will be used on the Seminole dam in the Kendrick Federal reclamation project in Wyoming.

Fire Damages Crushing Plant in Massachusetts

Fire caused damage estimated at $15,000 early in February when it partially destroyed the South Quincy plant of the Old Colony Crushed Stone Co., Quincy, Mass. According to Eugene R. Atwood, head of the concern, insurance covered the loss and rebuilding will go forward as quickly as possible.

All Officers Re-elected by Lawrence Portland

Officers of the Lawrence Portland Cement Co. were re-elected at the annual reorganization meeting at the main office in Northampton, Pa., in February.

Re-elected were: Warren Ayers, president; M. S. Ackerman, Sr., vice president; E. S. Sheppard, secretary treasurer.

WPA Makes Allotment for Arkansas Survey

An allotment of $3,936 has been made to the Arkansas Geological Survey by the WPA office at Washington for a survey of Pulaski County, Arkansas, limestone deposits, with a view of developing them for agricultural uses in supplying soil deficiencies.

A preliminary survey made by the state geology survey staff in 1936 revealed limestone beds 51-ft. thick along a 14-mi. stretch from Little Rock to Bauxite. State Geologist George C. Branner said tests of samples disclosed a percentage of 85 per cent. carbonate of lime.

Moyle Again Honored by Oglesby Workmen

PRESENTED WITH SUN - DIAL

Further evidence of the high esteem in which he is held by the workers of his company was given Richard Moyle, Sr., executive vice-president of the Marquette Cement Mfg. Co. on Feb. 7 when, with appropriate ceremonies, he was presented with a handsome sun dial which was installed in the rock garden of his home at Oglesby, Ill. The gift bears this inscription:

"Presented to Mr. Richard Moyle, Sr., February, 1938, by employes of the Oglesby plant of the Marquette Cement Manufacturing company, who are members of the United Cement Workers Union 20,066, in appreciation of his thoughtfulness and his consideration of us and as an expression of the sincere affection we have for him."

Not long ago employees of the Cape Girardeau, Mo., plant of the Marquette company presented to Mr. Moyle, as a tribute to his leadership, a large bronze plaque on which all their signatures were inscribed.

New England Road Men Meet at Atlantic City

A foot-square paving block designed to revolutionize New England's granite industry and highway construction featured exhibits at the 14th annual convention of the Assn. of Highway Officials of North Atlantic States, which concluded at Atlantic City, N. J. February 18. About 1,500 persons, more than half of them machinery and materials salesmen, attended the conference at which 11 states were officially represented.

It was declared that the new building block, invented by Louis F. Hewett of New York City, if widely adopted as a highway-construction material, could give the granite industry an outlet for millions of tons of scrap granite which now is not only useless but a nuisance. Cost of highway construction with the new granite-and-cement blocks would be 30 per cent. greater than with concrete, however.

The convention adopted resolutions condemning highway fund diversion.

The Blaw-Knox ready-mixed-concrete plant illustrated at the bottom of p. 123 of the January issue of PIT AND QUARRY is owned by the Michigan Limestone & Chemical Co., Buffalo, N. Y., and not the McCrady-Rodgers Co. as was indicated.

National Crushed Stone Assn.
National Lime Assn.
National Slag Assn.
Portland Cement Assn.

WITH THE TRADE ASSOCIATIONS

National Sand & Gravel Assn.
National Industrial Sand Assn.
National Ready Mixed Concrete Assn.

MARCH, 1938

Ohio Sand and Gravel Assn. Holds Meeting

The Ohio Sand & Gravel Assn. held its annual meeting on Feb. 1 at the Netherland Plaza Hotel in Cincinnati, O., in conjunction with the national convention. The meeting was brief and in the form of a noon luncheon but was well attended.

Officers were re-elected as follows: W. E. Hole, American Aggregates Corp., Greenville, president; J. J. Gorman, Zanesville Gravel Co., Zanesville, vice-president; J. H. Evans, Sturm & Dillard Co., Columbus, treasurer; Claude L. Clarke was again appointed executive secretary.

Besides the above the following were elected to the board of directors: Stephen Stepanian, Columbus; H. C. Slater, Columbus; W. O. Brewer, Chillicothe; A. E. Fresch, East Liverpool; D. S. Foland, Dayton; H. D. Stillman, Zanesville; H. H. Carpenter, St. Mary's; F. C. Fuller, Portsmouth; Hal Knight, Akron; J. J. Gorman, Zanesville; W. L. Talbott, Chillicothe; M. T. Epling, Gallipolis; E. P. Thomas of Novarre; Earl Zimmerman, Roy Camp and Charles Oberle of Cincinnati.

Keystone State Stone Producers Gather

The annual meeting of the Pennsylvania Stone Producers Assn. was held January 12, in the Penn Harris Hotel, Harrisburg, Pa.

President W. W. Duff was again elected to serve during 1938 as was General Manager H. H. Wagner.

S. W. Marshall, chief engineer of the Pennsylvania Department of Highways, discussed the suggested changes in specifications and stated that only two of the important sizes would be affected. He also discussed the Los Angeles rattler as an abrasion test and said that it might be required in individual stone plants, but only in exceptional cases and would not be adopted generally during 1938. While stone sand will not be included generally in the specifications, it will be allowed on such projects and from such sources as are approved by the department of highways, he declared.

H. S. Mattimore, chief engineer of tests, discussed the changes as they will be made in the sizes mentioned by Mr. Marshall. Mr. Mattimore also discussed the washing of crushed stone, stating that it will not be a requirement except in cases where any other method of producing clean material is unsatisfactory, but that he did not expect to increase the tolerance of deleterious matter allowed in stone. In discussing the Los Angeles rattler, he stated that they had been making a study of this method for the past three years, but were not prepared to adopt it for the testing of all aggregates. However, the highway department is using it for testing gravel. In speaking of stone sand he advised the producers that the department was making laboratory tests, principally freezing and thawing, of the cores taken from Route 30, stating that they were going to give this project a good fair study and any defects in the road would not necessarily be attributed to stone sand.

Name Paul Sunderland Director of Lime Assn.

After 45 years of continuous service, John F. Pollock, vice-president of the Ash Grove Lime & Portland Cement Co., Kansas City, Mo., has announced his retirement from active business life.

Mr. Pollock has also resigned as director of District 12 of the National Lime Assn. Serving in his stead for the remainder of the term ending June 30 of this year will be Paul Sunderland, Ash Grove's general superintendent.

Coming Events

March 17, 1938, San Francisco, Cal. — Convention, Assn. of Rock, Sand and Gravel Producers of Northern California.

May 9-11, 1938, Cincinnati, O. — Annual convention, National Lime Assn., Netherland Plaza Hotel.

N. L. A. to Convene at Cincinnati May 9-11

Announcement has been made by the Board of Directors of the National Lime Assn. that the annual convention of the organization will be held May 9, 10 and 11 at the Netherland Plaza Hotel, Cincinnati, O. The second day of the gathering will be devoted entirely to papers and discussions on operating problems of the industry, in accordance with the vote of the industry following a questionnaire sent out by the association.

The Kentucky Derby will be held May 7 at Louisville, Ky., and for the convenience of several members who have expressed a desire to attend before the convention opens, a block of rooms has been tentatively reserved at the Netherland Plaza for the night of May 7.

Irrigation Is Discussed by Concrete-Pipe Assn.

The American Concrete Pipe Assn. held its annual convention Feb. 15 and 16 at the Plaza Hotel in San Antonio, Tex.

The growing use of concrete pipe for irrigation was the leading theme of the meeting. C. V. Cochran, San Antonio, and W. H. Liston, Harlingen, Tex., pipe manufacturers spoke and told of its use in the Rio Grande Valley while Harry Ogle, Chico, Cal., gave an illustrated talk on how concrete pipe is solving the irrigation problem in California's fertile Sacramento Valley.

Mexican entertainment was a feature of the annual banquet held on the roof garden of the Plaza.

Ohio Firm's Business Doubles 1936 Figure

The Cunard-Lang Concrete Co., specializing in the manufacture of water-proof concrete blocks with headquarters at 459 Furnace St., Columbus, O., reports business in 1937 to have doubled the 1936 figure.

At the company's recent annual meeting Dr. C. L. Spohr was re-elected president, Joseph H. Bott, vice-president, and George Lang, secretary-treasurer.

EDITORIAL

Honesty in Business

IF ONE could listen closely, in his office, club, church, train, or stores, to the opinions expressed on the subject of honesty in business, he would hear a variety of views, for despite the fact that most of us share the opinions of the classes in which we were born and of the social groups in which subsequent circumstances have placed us, there are, as Montaigne said, no two opinions alike; and diversity is still the most universal quality. If one had the opportunity, the ability and the time to examine each of these divergent views and the causes that have given rise to them, he would probably find that the great disagreement that exists between the conflicting ideas expressed is due quite as much to fundamental differences in the conceptions of honesty and dishonesty as to any variances in the factual information that is supposed to underlie them.

Honesty and dishonesty are moral concepts and are, therefore, not susceptible to scientific analysis. Sometimes they seem to originate in prejudices arising from individual likes and dislikes; more often they are accepted on authoritarian grounds alone. In any case they evolve, they undergo change, in accordance with the conditioning moral factors of successive periods of intellectual development, so that the standards by which conduct is approved or condemned in this day are not those by which it has been judged in the past or will be in the future. The evolutionary stage in which we at any time encounter a given standard of conduct—such as this one of honesty in business—is the resultant that comes from an averaging of the almost infinite number of different shades of opinion, ranging from the extreme of approbation to that of condemnation. As the views of individuals move from one side to the other, the line of average or normal conduct shifts, and as individuals move from one social class or stratum to another their opinions lose many of the characteristics they possessed and are reshaped by the new influences that surround them. It is, therefore, as difficult to try to reconcile the standards of one day with those of another day, as it is to try to accommodate the views of one group to those of another.

So it is not to be wondered at that an important social topic such as honesty (and its opposite, dishonesty) should bring out such decided differences of opinion as can readily be found in ordinary conversations. Almost every variety of viewpoint that could conceivably be produced by many different causes working in many different circumstances on many different persons come to light in even casual discussions. They range from the attitude of the most extreme type of opportunist industrialist, who insists that the end, profit, justifies the means, to that of the post-Marxian socialist, who classes as robbery the taking of any profit, by which he means the amount by which the total income of any business exceeds the total income of the productive factors engaged in it. There could scarcely be a wider gulf between any two points of view.

Fundamental differences of similar magnitude are not new in economic history. The early Christians were opposed to the taking of interest for the lending of money, whereas their Jewish contemporaries were under no such religious restraint. The resulting concentration of finance in the hands of those who were free to act in such matters in a businesslike manner, effected a change in Christian ethics that probably would never have been accomplished by moral suasion. From its consideration as, what one writer calls it, "a gross and palpable method of getting something for nothing" to its almost universal acceptance as a legitimate business practice represents a long trail in economic evolution. So, too, with the ownership of property and the methods of its acquisition, particularly when the change of title involved one man's getting the better of another. The original idea of the "just" price placed upon the seller the duty of demanding only what was necessary for his support rather than all he could get. In spite of the great economic changes that have occurred since these principles were first enunciated—changes that make such ideas sound ludicrous to most of us—canon law experiences great difficulty in its attempts to reconcile modern economic practices as developed under severe competition with its own principle that it is illegitimate to make selfish profits at the expense of another.

THE reaction against any severe form of external control, even moral and religious, which followed the Reformation has left its mark on present-day economics. Most of us accept as proper the principle of profit-taking. Over and above repayment for his out-of-pocket expenses, for labor, materials, rent, interest, insurance,

taxes, and the like, we generally concede to the *entrepreneur* the right to take a profit as compensation for the risks that beset his enterprise. People may, and often do, quarrel with the rate of profit; they may, and more frequently do, dispute the justice of some of the methods that are employed to obtain profits. They seem to believe that the desire to make a profit, however right in itself, does not justify, any more than it implies or necessitates, the right to defraud, deceive or betray. Growing numbers of them apparently think that profit-making must be surrounded with restrictions to prevent its abuse and to insure that if profits are to be gained, they will be gained honestly.

TO these criticisms and to the suggested remedies most business men will probably reply with glib assent. Many business men try to be honest even in the face of competitive methods that make a strict interpretation of honesty almost the equivalent of business suicide. Few business men have lived long enough to recall the days when the aspiration to render an efficient and a useful service or to supply a good product for which a demand already existed was the principal incentive that induced men to risk their own and other people's money by starting new enterprises. Most of them have been born and bred in an era wherein the competitive spirit often exhausts itself in an effort to divert current income or accumulated savings from the possession of consumers to the bank accounts of manufacturers or service purveyors. Under present economic conditions almost every man who has something to sell, whether a good product or a shoddy one, lives in constant dread that some competitor for the consumer's dollar will be the first to get possession of it. Lest that calamity befall, he is tempted to adopt every method at his command that will prove of use in making himself, rather than some competitor, the recipient. And as those who compete with him in this battle of wits are not alone those who offer a similar product or service, but also those who offer other products and other services, he finds himself with not only a few competitors but legions of them.

In such circumstances electric razors compete with women's dresses, pianos with automobiles, cigarettes with foods, cosmetics with health and sanitation, installment-selling with investing. The market for a given product of general utility is not determined by the number of people who can effectively, properly or profitably use it, but rather by the number of people who have enough money, either accumulated or in immediate prospect, to purchase it. The emphasis has shifted from the use value of the article to the purchasing power of the prospect. The question is not, for example, how many people want to listen to the programs of foreign radio stations, but how many people have enough money or income to buy a receiver that will bring them in. Again, the question is not whether a man can obtain a better shave with an old-fashioned razor, a safety razor or an electric razor, but whether he can pay the price of the most expensive variety. Or, as another illustration, the question is not whether a family would be better advised to save its money and build a home or provide for old age, but whether it can be induced to place its monthly savings in a second automobile.

Under the influence of this new type of competition manufacturers and merchandisers are constrained to avoid specific statements about the quality of their products or the efficiency of their services and to dwell upon such deceptive means as the use of fear—the fear of being thought poor, unpopular, ignorant, old-fashioned, weak, old, thrifty, fat, different, and so on. Gadgets take the place of genuine quality; showy changes pass as important improvements; superficial differences appear, while fundamentals remain unchanged. Obviously something more potent, more beguiling, more alluring, than truth is needed to make the spurious seem genuine, to make people want things they do not need, to sell claims rather than qualities, to make unrealities appear real.

THIS switch in competitive effort, from the desire to produce or to do something better than one's competitor to the desire to "beat him to it" in the race for the consumer's dollar, seems to explain the alarming growth in the use of fraud, deceit, falsehood and the other forms of dishonesty that have become the props of too much of modern business. Buyers are becoming cynical under this modern, endless barrage of conflicting claims, overstatements, paid testimonials, pseudo-science and other tricks of the side-show barker and traveling medicine man, because regardless of one's personal standards of straightforwardness, truthfulness, sincerity and fair-play, every man normally expects to find these qualities in those with whom he deals and resents every attempt to impose upon his naturally credulous nature. Government's assaults on these all-too-popular practices of highly-competitive modern business indicate no new approach to the problem of protecting national well-being, but an inevitable reaction to methods that have become as dangerously destructive of the soundness of business as of the faith of the public in the honesty of business men.

Technical Problems, Economic Topics Occupy Attention of Sand-and-Gravel Producers at Cincinnati Convention

SURPASSING all previous attendance records with a registration of 488, the twenty-second annual convention of the National Sand & Gravel Assn. and the eighth annual convention of the National Ready-Mixed Concrete Assn. drew visitors from all parts of the United States and even from British Columbia, Canada. The exhibition of machinery held in conjunction with the conventions by the members of the Manufacturers' Division of the gravel association drew large crowds of interested visitors. The meetings and show were held in the Netherland Plaza Hotel, Cincinnati, during the week beginning January 31.

Separate meetings of the two associations' boards of directors were held on January 31 and the exposition opened that evening with the displays of 39 equipment manufacturers.

The board of the gravel association considered the reports of V. P. Ahearn, its executive secretary, and Stanton Walker, its director of engineering. It decided to hold its summer meeting in Dallas, Tex., late in June.

The ready-mixed-concrete board met jointly with the association's Technical Problems Committee and the Standards Committee and discussed recommended practices and standards for truck-mixers and agitators of the revolving-drum and open-top revolving-blade types.

Mayor James G. Stewart of Cincinnati welcomed the convention visitors at the opening session of the two associations' joint conventions on Tuesday with Alexander Foster, Jr., and J. L. Shiely, their presidents, serving as joint chairmen.

"If there ever was a time when industries must stand together or fall one by one, this is the time," said Mr. Foster. "Trade associations in general and the National Sand & Gravel Assn. and the National Ready-Mixed Concrete Assn. in particular are proving themselves to be of growing benefit and importance to their industries.

"If our executive officers at Washington did no more than keep industry posted on the rapidly-changing legislation which is affecting us all, we would be well served", he continued. "However, we are happy in having at the head of our paid staff two men, who by training, experience and ability, are eminently adapted to looking to the needs of our industries, both from the technical and the legislative side.

"The problems surrounding the labor relations of our industry have been an extra function and burden put upon the association, and it is one of growing importance. Yesterday at our meeting of the board of directors of the National Sand & Gravel Assn. it was indicated that the forms of contract provisions which would be applicable in many different sections of the country and which had gone out from Washington had benefited many of our members. So it is, in my opinion, one of the new and growing functions of this association to keep before the members of the industry not only changing legislation as it affects our industry, but also the relations of industry and labor. . . .

"I have said this about the growing importance of the association to us all, and yet I am told that in 1936 the cost of the association to its membership represented .03 of one per cent. of the value of the products of the industry. That is a pretty low cost and one that I think can be increased and should be increased, if we are to receive the benefits that this association can give the industry."

Speaking of the importance of the National Ready-Mixed Concrete Assn., President J. L. Shiely said in part: "We have ceased to be a medium through which sand and gravel and cement are marketed. To-day the ready-mixed-concrete industry stands out as one of the industries of the country. These conventions bring out the best for the industry, because one man in one locality may do something that may injure all the rest of the members of the industry; and yet one man, no matter how small—and I have in mind one man whom I have met in my travels through the country, who operates a little four-truck business—may reflect credit on the entire industry.

"I think I can say that we have ceased to be a middle-man for sand and gravel and cement. I think we have reached the point where we are not selling just service, but quality. We are selling a lot of brains that have been put into this industry, a great deal of it contributed by the engineering research bureau of the sand-and-gravel association, plus the work of technical minds, such as Mr. Thomson and Mr. Young, who for years have contributed of their time and money and energy to build up your business and my business."

What Industry and Government Can Do to Stimulate Private Construction was discussed by B. L. Johnson, editor of the *American Builder and Building Age.*

"The construction industry has completed four years of recovery", said Mr. Johnson. "This recovery has been very substantial from a very low point, four years ago, up to a substantial volume for the year 1937. It is true that 1937 closed with a considerable setback, and yet the total for the year was quite satisfactory. I find that the total for all construction projects in the United States for 1937 was about $3,190,000,000. This volume is made up, of course, of the three

major classifications: (1) residential construction, (2) non-residential construction, (3) public works and public-utility construction. Of these various groups, 1937 showed a 15-per cent. increase in residential building over the preceding year and a 21-per cent. increase in non-residential building, with a 40-per cent. increase in public-utility construction. There was, however, a 20-per cent. decrease in public works. . . .

"I think, regardless of our personal politics, we must all agree that the Federal government has been very solicitous toward the construction industry", Mr. Johnson said. "It has indicated a desire to be helpful. There is some question, of course, as to just how helpful some of the measures have been, but on the whole I think, in fairness, we must recognize that the administration has been construction-minded. One of the very first moves, of course, in fighting the depression was the setting up of the Public Works Administration and the vast appropriations for public works, all of which redounded directly to the benefit of this industry. . . . Among other items there are four substantial ones: Portland cement with $310,000,000 purchases, concrete products with $91,000,000, crushed stone with $101,000,000, and sand and gravel with $132,000,000, making a total of about $700,000,000, which represents direct purchases by the Federal government of the products of the industries with which we here are most concerned.

"Now, backing up the Public Works Administration . . . we find other agencies which were set up to do specific jobs and which have done them in general in a very satisfactory way: the Federal Home Loan Bank System, which rescued the building-and-loan associations and put them on a paying basis so that the people could again have confidence in investments, in building-and-loan shares; the Home Owners' Loan Corporation, which stepped in and rescued about 2,000,000 distressed properties, homes that had come into default. While we will find many people who criticize certain details of H.O.L.C. policy and administration, the results speak for themselves, that out of that mass of delinquent and distressed real-estate properties only some 15 to 18 per cent. have failed of being rescued up to date. That is a remarkable record when we consider the condition under which those properties were taken over under H.O.L.C. auspices three years ago.

"Then we have the Federal Housing Administration, which was set up to do and which did a magnificent job in restoring the morale of the home-building industry and the late load-bearing commercial industry", continued the speaker. "It is an agency to insure mortgages which are issued under certain rules and regulations as to the ability of the borrower to repay his obligation. Picking out just one accomplishment of F.H.A., I would like to cite the change in the average attitude toward a mortgage and toward home buying. Where before mortgages were short-term mortgages and almost all homes were purchased with the idea of returning a profit within a few years, the F.H.A. policies have set up the long-term amortized mortgage, which leads eventually to complete ownership of the property rather than a speculative asset. . . .

"I believe within the course of the next year you are going to see some substantial sales of your materials for projects sponsored by local housing authorities and constructed from funds lent by the United States Housing Authority. This program is somewhat slow in getting under way, necessarily so, and yet it is attacking a part of the housing market which private industry can not cover. Personally, I am very sympathetic to the effort of the Federal government, working strictly through local public-housing facilities and authorities, to attack this problem and to give the low-income families a better deal on housing. . . .

"Recently we have been fighting through the Congress some amendments to the Housing Administration Act, and the latest advice is that these amendments are being adopted", Mr. Johnson continued. "There has been criticism in regard to the 10-per cent. equity, the 90-per cent. loans, which are possible under these amendments to the act. As far as I can see, all

NATIONAL SAND AND GRAVEL ASSOCIATION

1938

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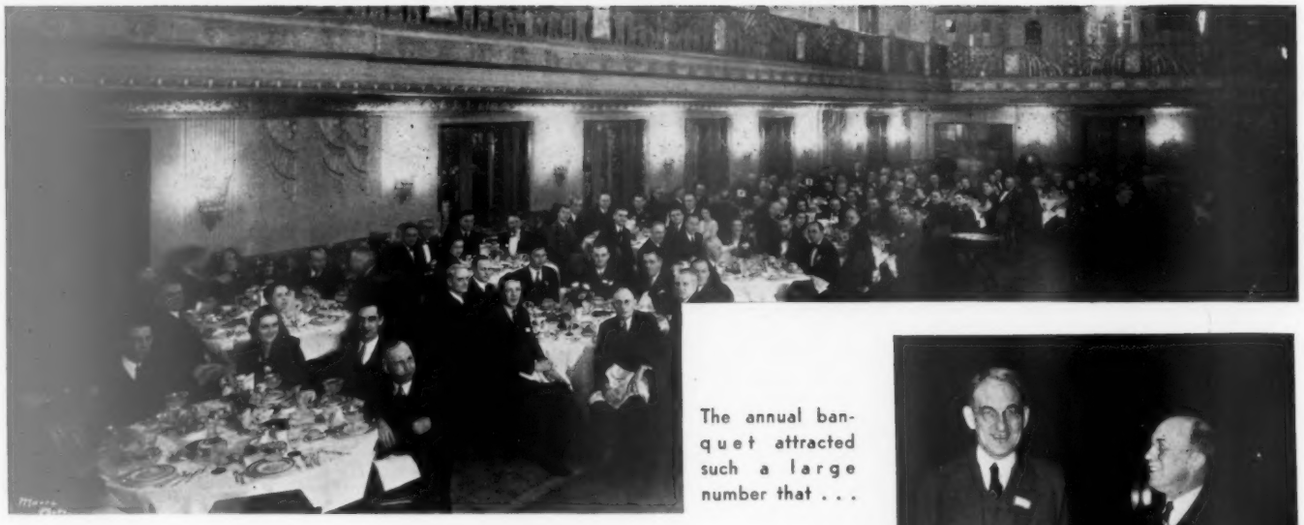


The annual banquet attracted such a large number that . . .

Alex W. Dann, Dravo Corp., Pittsburgh, Pa., and John Prince, Stewart Sand & Material Co., Kansas City, Mo.

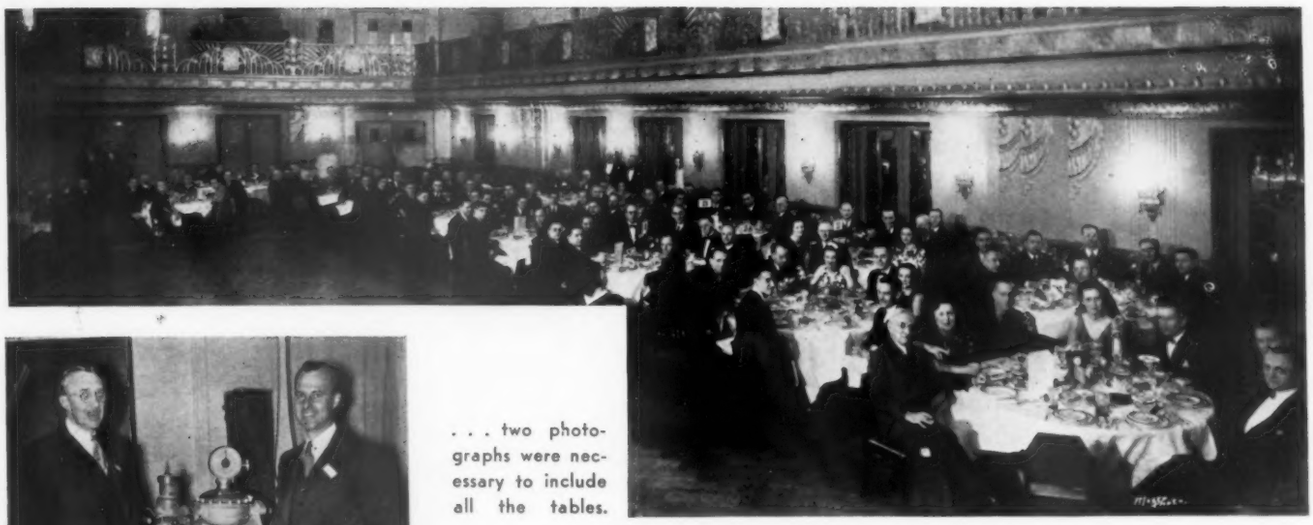
that means is that the habit of the industry to grant 90-per cent. loans is going to be legitimate now. Builders have been making 90-per cent. loans for a long time, but they had to cover up how they did it. Some have questioned the security back of such a loan. The families that lost their homes in the late boom period and after, lost them not because of a narrow equity but because they were overloaded with properties that were too expensive for them to carry. . . .

"Turning to the home-building field, the field of light construction, we find that high taxes are a very great deterrent toward investment in the home", continued Mr. Johnson. "We have been putting a penalty on home ownership, where it would seem that good public policy would indicate we should put a premium on home ownership. . . . In Illinois we found last year a little item of 30c. a hundred added to our tax bills for poor relief. In the State of New Jersey this last year home owners found a little item added to their home tax bill to pay for the state soldiers' bonus. These things just indicate that the home owner, when he puts his name on a deed and registers it in the county courthouse, is running up a flag for the taxing bodies to shoot at, and until we can be broad-minded enough in this country to recognize that the home owner in assuming the burden of putting up a store or a factory building, making a real investment in the community, is doing a praiseworthy thing and should be protected and not shot at, we are going to have

Hayden Brooks, Brooks-Taylor Co. and B. F. Devine, Chain Belt Co.

Facing the camera are C. F. Strasmer, Buffalo Gravel Corp., Buffalo, N. Y., Ray V. Warren, Western Pa. Sand & Gravel Producers' Assn., Pittsburgh, Pa., and V. P. Ahearn, National Sand & Gravel Assn. In the background is M. G. Kerr, American Aggregates Corp., Detroit, Mich.

V. F. Larson, Nordberg Mfg. Co., F. M. Taylor and C. B. Ireland, both of the Birmingham Slag Co., Birmingham, Ala.



. . . two photographs were necessary to include all the tables.

J. F. Berger, John A. Roebling Sons Co., and J. E. Spangler, Spangler Mfg. Co.

H. F. Thomson, General Material Co., St. Louis, Mo., O. S. Conrades, St. Louis Material & Supply Co., St. Louis, Mo., and W. A. Bliss, Dravo Corp., Pittsburgh, Pa.

S. W. Stauffer, National Lime Assn., Washington, D. C. and J. M. Gager, Gager Lime Mfg. Co., Chattanooga, Tenn.

a hard time in really establishing the construction industry on the scale that many of us feel is justified by sound public policy. . . .

"Now, in the field of heavy construction, commercial work, unquestionably the biggest thing that the Federal government could do to-day to stimulate activity would be to repeal the undistributed-profits tax, the surtax on undistributed profits. It is estimated that the tax as now on the statutes increases the cost of plant construction, any building work done by corporations, to the extent of about 20 per cent. . . .

"If you will analyze home-building costs to-day in the typical community", said Mr. Johnson, "get your local costs, you will find that better homes are being built to-day for the same money than were built in 1925 to 1926 by 25 per cent. Progress has been made during these depression years. Building materials and building equipment have been perfected, so that they go into the job with less effort, they go into the job in bigger units. Skilled management has learned on the job in the last five or six years how to cut certain corners. The fact that lumber may be up somewhat per 1,000 bd. ft. or that steel may be up somewhat per pound, that cement or brick may be up somewhat, doesn't mean a thing in regard to the total cost of the building. The cost of the building is a combination of materials and labor and management and financing, design, cost of the building site, cost of the occupancy.

"Many of those factors have been

A. A. Levison and R. T. Harris, both of the Blaw-Knox Co. talking to a producer. In the background are R. P. McKendrick, Blaw-Knox Co., G. C. McCullough, and C. O. Dunn, Blaw-Knox Co.

O. J. Ellertson, Pioneer Eng. Works, G. R. Slowey, Quaker City Rubber Co., C. K. Ordway, Pioneer Eng. Works, and C. J. Thoben, Quaker City Rubber Co.

very greatly decreased in the past few years. One of the most notable savings that is available to-day to the home owner or the building owner, the commercial building owner, is cheap money. . . . Suppose a $5,000 mortgage was written in some previous time at 7 per cent., and it was to be paid off in 20 years, in monthly payments, and those monthly payments were figured at $38.70 each. At the present time a good many mortgages are being written at 5 per cent. Now consider the difference. . . . A $5,000 mortgage at 5 per cent. interest paid off monthly for 20 years—ah, not 20 years; it will be paid back in 15½ years for that same monthly payment of $38.70. The owner has 4½ years of free rent because of the saving of 2 per cent. in interest. . . .

"If we consider the typical home-acquiring program", Mr. Johnson said, "we find that there are four types of expense. We have the expense of the building site, the expense for financing, the expense for profits and fees, and then the cost of labor and material on the job. In the old days those first three preliminary expenses were about 50 per cent. of the total, so that on a $6,000 appropriation for acquiring a new home only about $3,000 could go into the building itself. At the present time there have been savings in the building site, which is now priced for use and not for speculation, savings in financing which I have just mentioned, savings in fees and profits, because industry is working on a closer margin. Those typical preliminary expenses now represent only about a third of the total where formerly they represented a half. In other words, on a $6,000 project we now have $4,000 available for construction on the job, materials and labor, against $3,000 available in the previous era. So you see we not only have more house for the dollar, but we have more dollars for the house, and that represents a big advantage. . . .

"In Cleveland a movement has been generated through the joint efforts of Mr. Dalton, the president of the Cleveland Trades Council, and Jim Caffrey, the special assistant to the Federal Housing Administrator in the Ohio area, under which labor, for the first time has undertaken to become consumer-minded, customer-minded, and has joined with others in the active promotion of building jobs in the Cleveland area. Not only have they done that, but they have gone to the Miami, Fla., meeting of the American Federation of Labor and presented their program as one which should be adopted by organized labor on a nationwide scale. . . . President Joseph A. MacInerny has approved this movement and has appointed a committee, consisting of Dan W. Tracey, national president of the Electrical Workers' Assn.; Richard J. Gray, secretary of the Bricklayers', Masons' and Plasterers' International; and William L. Hutchinson of the Carpenters' and Joiners' International Union; who will coöperate with Mr. Caffrey and Mr. Dalton to draw up this plan and put it into operation on a nationwide scale.

"This is one of the most encouraging things that has occurred to my knowledge in 25 years. If you will consider the way organized labor has been presented to the building public through the newspapers, you will realize that whenever you think of labor you think of trouble. . . . Here for the first time labor indicates that it is consumer-minded, customer-minded, and is pledged to deliver a big value for the wage which is paid."

Charles M. Upham, engineer director of the American Road Builders' Assn., spoke in answer to the question *What is Ahead for Highways?*

"Since 1916 the highway program has more and more centered around the Federal aid", said Mr. Upham. "At first Federal aid contributed only 7 or 8 per cent. of our entire highway program, but since the depression the relative amount of Federal money in the highway program has jumped to about 45 per cent. When you consider the effect that the Federal aid will have upon total expenditures, I think we can safely say that the highway program of the country is dependent upon our Federal-aid program even more than to an extent of 45 per cent., not only from the financial contribution, but from the influence on standardization, unification and the creation of a national system to furnish facilities for our national needs. The Federal aid called for a highway commission in every state in the Union, it required certain standards and similar specifications, it has forced the states to maintain the roads, and it has been the common meeting ground of the common problems among the states. It also is one of the strongest forces that we have to fight, our common enemy, the diverters of our highway income. . . .

"During the past year and a half", the speaker went on, "the Bureau of Public Roads has taken the lead in the enforcement of Sec. 12 of the Hayden-Cartwright Act, which states that after due deliberation by the Congress it has been considered to be unjust and unfair to divert any of the highway revenues for any purposes other than roads, and that if a state continues to divert more than it was diverting in June, 1934, there is to be withheld from the state an amount of money up to one-third of its Federal allotment. Now the Bureau was rather slow in getting this into effect, but already over $30,000,000 has been returned to the highway program as a result of Sec. 12 administered by the Bureau of Public Roads. Pennsylvania alone has put back $22,000,000. Maryland put back $3,500,000. . . .

"The financial aid of the Federal bureau for the highway program constitutes at least 50 per cent. of your

business and possibly more, so that it is a very important factor in the continuation of your own business that the highway program be continued. This aid has ranged from about $5,000,000 in 1917 to $200,000,000 in the past few years, and this was supplemented with emergency funds as high as $400,000,000 on two occasions. . . .

"The story up to a few months ago, as far as the highway program went", said Mr. Upham, "was about as follows: There was $150,000,000 left over from earlier appropriations. This $150,000,000 had to be matched by the states. There was also $275,000,000 that would be spent by the states on the non-Federal roads, and the 1939 Federal-aid program, together with the matching, would amount to $350,000,000. That gave us a total authorization for highways of $925,000,000, which we could have looked upon as one of our largest years; that was the year 1938. . . . On November 27 the President sent his message to the Congress. . . . It did not ask that Federal aid be reduced or be spent a portion this year and a portion next year, but it asked for a definite and clear cancellation of the 1939 Federal aid, which would have amounted to $350,000,000 when the matched money was taken into consideration. Here is the definite recommendation of the President: 'First, provide for the cancellation of the 1939 authorizations prior to January 1, by which date the Secretary of the Agriculture is required to apportion to the various states $214,000,000 of such authorization.'

"Now, continuing his message: 'Second, limit to not more than $125,000,000 per year all public roads authorizations for the fiscal year 1940 and for each of the next few succeeding years.' That is reducing the Federal aid from $200,000,000 down to $125,000,000. . . . Here is one other thing that is probably more significant than the amount of dollars that he has referred to: 'There is another provision of the existing law relating to public roads which should receive consideration in this connection. The Secretary of Agriculture is required to apportion to the states the annual amount authorized for appropriation and to approve projects of proposed state expenditures thereunder which shall constitute contractual obligations of the Federal Government, regardless of availability of appropriations for their payment and of the fiscal outlook of the treasury. This mandatory provision completely ties the hands of the executive as to the amount of road funds to be included in the budget for any fiscal year. While I do not object to the apportionment among the states of such amounts as may be authorized for appropriation, I do most strenuously object to the mandatory incurrence of obligations by the Federal government under such apportionments without regard to its ability to finance them from its revenues. I, therefore, recommend that the Congress take the necessary action permanently to eliminate this provision from the Public Roads Law.' . . .

"The funds were allocated to the states on December 31, but when Secretary Wallace sent the apportionments to the various states, he sent along a letter stating that, according to the Hayden-Cartwright Act they are making the apportionment to the various states, and they gave a list of the states with the amount of money that each state would receive, . . . 'I have been requested by the President that you do not present any highway programs to the Department of Agriculture until after the Congress has had further time to reconsider the President's message and possibly cancel the 1939 Federal-aid appropriation or Federal-aid authorizations.' So you can see that even though the Congress did not do anything in December, the question of the $350,000,000 has not been settled. . . .

"In his recent message to the Congress the President had much to say about coöperation between industry and the government, with the ultimate objective of raising the purchasing power of the nation to $90,000,000,000 or $100,000,000,000; but the only way to raise purchasing power is to foster the use of capital and labor in useful and productive services that bring in turn more employment for more people. Purchasing power may be redistributed by merely taxing those productively employed in order to maintain on a subsistence basis those who are unable to find productive employment, but it can not be increased in that way. Coöperation must be a two-way process. If government wants the coöperation of industry, it should put a premium on those activities that will help industry to maintain its end of the process. No form of business or industrial activity contributes more effectively to the generation of higher national income than does highway transportation.

Analysis of Attendance at the Twenty-Second Annual Convention of the National Sand & Gravel Association and the Eighth Annual Convention of the National Ready Mixed Concrete Association Cincinnati, January 31 to February 3, 1938

	National Sand & Gravel Assn.	National Ready-Mixed Concrete Assn.	Totals
Producing companies' representatives	154[1]	111[2]	265
(Companies represented)	(104)	(74)	(178)
Association employees			8
(Associations represented)			(5)
Equipment manufacturers' representatives			156
(Companies represented)			(59)
Trade-publications representatives			10
(Trade publications represented)			(3)
Guests (including 19 ladies)			49
Total registration			488

Large Groups in Attendance

Producers:

American Aggregates Corp.	8
Universal Atlas Cement Co.	7
Ohio Gravel Co.	5
Richter Concrete Co.	5

(Six companies had 4 each, 9 had 3 each, 27 had 2 each, and 135 had 1 each)

Equipment Makers and Publications:

Allis-Chalmers Mfg. Co.	6
Chain Belt Co.	6
Nordberg Mfg. Co.	6
Blaw-Knox Co.	5
Jaeger Machine Co.	5
Robins Conveying Belt Co.	5
Pit and Quarry	5

(Seven companies had 4 each, 13 had 3 each, 14 had 2 each, and 23 had 1 each)

[1]Thirty-five of these individuals are connected with companies which produce ready-mixed concrete also.

[2]Eight of these individuals are connected with companies that produce sand and gravel also.

"During 1936 motor transportation in all its phases provided more than 6,000,000 jobs. That was one out of every seven of all those who were gainfully employed. Ten years ago it employed one out of every ten. One out of every seven loads of carload freight on the railroads was of automotive products. One out of every five retail dollars results from automotive purchases, and more than 465,000 establishments are engaged in automotive sales and service and for higher transportation. . . .

"If Federal aid is not still forthcoming to the states, you will find a tendency in the states to divert money that is now being used to match Federal aid", concluded the speaker. "Not only has Sec. 12 of the Hayden-Cartwright Act brought some money back into the highway program, but it has also kept money that otherwise would have been taken from the highway program. If we do not have a substantial amount of Federal aid, you will find a great deal more money diverted, so our highway program will be a very small amount."

In the absence of John C. Gall, counsel of the National Assn. of Manufacturers, who was scheduled to discuss *Federal Legislation of Interest to Industry*, Ray S. Smethurst of the same organization told the audience about some of the prospects for laws affecting business. He reviewed what the present Congress has done in comparison with its immediate predecessor and then spoke of proposed action which might relieve present uncertainty. In referring to proposed revisions of the internal-revenue laws, he said:

"The subcommittee of the House Ways and Means Committee has been studying the proposal since last November, and along about the 14th of January it submitted its recommendations to the full committee. I am not a qualified tax expert by any means, but, generally speaking, those recommendations apparently have been received favorably. The comment generally has been that they are fine as far as they go, but they do not go far enough. One of the fundamental propositions underlying tax revision was the feeling that the capital markets had been frozen up, that by penalizing corporate surpluses and forcing their distribution at the risk of higher taxes, the law was discouraging investment and was penalizing those corporations which had to rely on their own earnings to be put back into business for expansion or improvement. If one principle can be said to underly tax revision, I think that was it.

"In recognition of that principle certain changes were made in the undistributed-earnings tax, at least changes were recommended by the subcommittee. While the tax is continued and exemption has been granted for corporations earning not over $25,000 a year, the rates have been somewhat reduced and improvements have been made in the capital gains and losses provision. However, it now becomes apparent that while we have attempted to ameliorate the evil condition existing under the original statute, they now propose a new form of tax which in most cases would be even more onerous than the original form of the undistributed profits tax, and that is the tax on so-called closely-held corporations. The tax would be at the rate of 20 per cent. on corporations which are owned or controlled by one person owning more than 50 per cent. of the stock, and so on. The tax would be on the undistributed title 1-B income, as it is called.

"The next subject which is being discussed in Washington is the National Labor Relations Act, and even more the entire labor policy of this administration", said the speaker. "The law has now been in force since August, 1935. During that time, and after it was sustained by the Supreme Court, the administration of it by the National Labor Relations Board has certainly revealed the fundamental defects in the law and the even greater defect in entrusting its administration to an agency as pro-labor and partial as the present National Labor Relations Board.

"In a recent hearing on a resolution proposing an investigation of the National Labor Relations Board and its administration of the act held before a subcommittee of the Senate Committee on the Judiciary, Senator Burke presented a *prima facie* case, showing that the board has misconstrued the fundamental purposes of the act. It has shown bias against certain forms of labor organizations and has done nothing for the benefit of employers, where the statute permitted a construction which would have authorized the board to proceed along that line. . . . Whether this resolution will be favorably acted upon is questionable at the moment. I merely cite it, as an illustration of a growing receptivity, shall we say, on the part of certain senators and congressmen to the pleas that business has been making for the past four years. Someone in an official place at least recognizes some merit to the contention of employers directed against the National Labor Relations Act.

"However, amendment of that law is not the final answer, as you well know", continued Mr. Smethurst. "You can comply with the law one hundred per cent. and still not have peace. Developments on the Pacific Coast perhaps are more widely known than developments in your own and related industries. A law which permits an election among employees and certification of a union which receives the majority of the votes cast in an election is immaterial, if, after certification, a small group defeated in the election decides not to abide by the rules and calls a boycott or some other form of labor activity to disrupt production and distribution. You will recall that the President called attention indirectly to that situation in his message to the Congress in January. . . ."

In addition to the tax and labor policies which are undergoing revision at the present time, one must not, in the speaker's opinion, overlook the activities of the Burns Committee, investigating the causes of unemployment, the size of the government's permanent or temporary relief load, and the permanency of unemployment, whether due to technological causes or to temporary shifts and economic depression. Another development worthy of note is the so-called 10-point program advocated by a group in the Senate. In Mr. Smethurst's opinion, it is "one of the most constructive and statesmanlike documents we have seen in a long time".

"We have become familiar with the Richberg Plan, with the so-called Jackson Plan, and with the O'Mahoney Bill, which is now pending in the form of actual legislation in the Senate, and many commentators have pointed out that these proposals are all inconsistent, that they approach the subject of business regulation from entirely contradictory standpoints," the speaker continued. "The substance of the Jackson proposal, or of those who assert they represent the viewpoint Mr. Jackson does, is that the chief difficulty with business at the present time is the fact that it is dominated by large units, that corporations have become so large that they have become governments in themselves and during periods of recession they disrupt the market, they have the power to discharge thousands of workers, and that the purchasing power represented in wages is so tremendous that any reduction immediately promotes or encourages a business recession. So this proposal starts on the premise that these big aggregations of capital, or these big corporations, should be broken up and conditions established so that they will not be permitted to grow again, and this would be done either by taxation, by a modification of the patent laws, or

by vigorous enforcement of the Sherman Act and Sec. 7 of the Clayton Act, in order to compel the dissolution of large units in order to localize and decentralize industry throughout the country.

"Mr. Richberg's proposal, on the other hand, accepts business as it is, and his idea would be, first, to clarify and redefine the basic prohibitions of the Anti-Trust Law, including the Federal Trade Commission Act and, I imagine, the Robinson-Patman Act, in order to clarify the prohibitions upon alleged unfair business practices or illegal combinations of activities. The second step would be to establish a commission, something comparable to the Federal Trade Commission, and allow industry to come in and suggest its own plans for coöperation or coördination—planning, if you want to call it that—and have the government approve or at least acquiesce in this plan of self-regulation advanced by business groups. When these plans were once approved, if they subsequently developed practices contrary to the public interest, then the government could still proceed to compel abandonment of the plan or agreement, but in a civil proceeding and not making it subject to any criminal liability at all.

"That, in just brief outline, is the substance of Mr. Richberg's proposal as it now has developed. Off hand, it does not conflict with the so-called Jackson idea of regulating business. On the other hand, it can be viewed as merely supplemental to Mr. Jackson's proposal. In other words, you could put into effect the Jackson scheme, you could break up large units, decentralize industry, and then allow coöperation among units of comparable size, so that, as I see it, the Richberg proposal could begin where the Jackson ends and the two are not necessarily inconsistent.

"The O'Mahoney proposal, which is now before the Senate Judiciary Committee, likewise accepts business as it is, the present size of business, and proposes to put all corporations, and in some cases individuals, under licenses. The industrial planning or business planning contemplated in the O'Mahoney Bill would be imposed by government and not planned or offered by business. The bill would make it unlawful to engage in commerce without a license, and commerce is defined to mean production of goods to be shipped in commerce, the assembly of raw materials from which articles are to be produced, or the sale or transportation of any product in interstate commerce. In other words, it would cover practically any industrial enterprise in the country.

"These licenses, like all kinds of licenses, are not given free, and you would have to comply with a multitude of conditions in order to be eligible for a license, and after having a license conditions would have to be complied with in order to keep the license. The conditions vary from rigid labor regulations, including compliance with the substance of the National Labor Relations Act, compliance with the Federal Trade Commission Act and the Sherman Act, and, besides the labor and trade-practice requirements, every corporation would have to agree to adjust its internal affairs and management in accordance with the provisions of the O'Mahoney Bill. . . . One provision dealing with corporation surpluses provides that the surplus shall equal or be in excess of the capital stock of the corporation. It provides further that where that surplus exceeds 50 per cent. of the capital stock of the corporation it can go no higher, and that after dividends have been paid up to 16 per cent. the corporation would be required to put into effect a profit-sharing scheme to increase the wages of its employees."

The afternoon session was devoted to matters of special interest to ready-mixed-concrete producers—a report of the Technical Problems Committee by its chairman, R. B. Young, and reports of the committees on Standards for Truck-Mixers and Agitators—one for the revolving-drum type and the other for the open-top, revolving-blade type—by Stanton Walker, chairman of both committees.

The Committee on Standards for Truck-Mixers and Agitators of the Revolving-Drum type decided that it would be best, in view of the action likely to be taken by the Joint Committee on Concrete and Reinforced Concrete, to incorporate in its specifications the provision that "mixing time shall start after all ingredients, including water, are in the drum". It decided also to interrogate the ready-mixed-concrete industry on this point to obtain information that might be helpful to the Standards Committee at its meeting in Chicago on February 21, prior to the convention of the American Concrete Institute.

The report of the Special Committee on Truck-Mixers and Agitators with Open-top, Revolving-Blade Construction offered no recommendations, because on two important questions, which related to the imposition of a limit on truck-mixer capacity based on drum capacity and to the raising of the minimum mixing speed, the voting members of the committee were evenly divided. One member of the committee, F. H. Fleming of the Concrete Transport Mixer Co., St. Louis, was authorized to collect data relating to the efficiency of the revolving-blade type of equipment as a concrete mixer and agitator.

H. F. Thomson, chairman of the Committee on Standards, did not present a formal report but confined himself to a few comments on the subject of ready-mixed-concrete standards.

"I think that we should be in the position of leaders rather than fol-

J. C. McLanahan, McLanahan & Stone Corp.; Bruce G. Shotton, Hendrick Mfg. Co.; and Irving Warner, Warner Co., Philadelphia, Pa.

A. E. Fielding and R. S. Hunt, both of the Screen Equipment Co. explaining how it works.

lowers in connection with any standards development", he said. "In other words, this recommendation regarding the revolving-drum mixers, I think, indicates the opportunity for us to take a very forward step. It would be unfortunate if we were to find ourselves in the position of having to follow something that the other fellow insisted that we do, whereas if, with the welfare of the industry at heart we can set up the standards for our own operation which will insure to the construction industry the delivery of better concrete than it can get otherwise, I think we are very definitely helping our own position. We are putting ourselves in the position of developing confidence in what we have to say. It has been really flattering in the last two years that some of the suggestions which have come from the ready-mixed group have been very favorably considered by other technical groups, such as the A.S.T.M. and the A.C.I. and to a certain extent by the Joint Committee. Now that we have got to the point of establishing a degree of confidence in what we feel will guarantee good concrete, I don't think we ought to stop. I think we ought to insist that any standards that we recommend are such that we can go before these other technical societies and ask them for enforcement of the various features which we are outlining.

"When concrete was anything over 2,000 lb., the matter of early aging was not particularly important, but as ready-mixed has come in with more accurate determinations, with the growth of strength-concrete requirements, and also the introduction of higher-strength cement, the history of cylinder curing the first 24 or 28 hr. is exceedingly important. In other words, if the cylinder is allowed to be cooled on the job and then tests low at the end of 48 or 72 hr., it is not necessarily an indication that the quality of the concrete was deficient in any way. There have been instances where ready-mixed concrete has been penalized as a result of lack of standard curing characteristics or curing conditions, simply because the A.S.T.M. did not require it. Largely as a result of the observations that have been passed on to the proper committee of the A.S.T.M. by the ready-mixed operators, they did take the action last year of requiring that these test cylinders be maintained at substantially 70 deg. F. and in a moistened condition during the period between casting and the time they are removed to the laboratory. That is a relatively small point, but it offers the opportunity of the ready-mixed industry being in the position of knowing that its cylinders are going to be properly handled. It is the kind of item that the development of ready-mixed concrete has called attention to, whereas the former more-or-less haphazard operations did not find it so necessary."

Many of the reasons for adding lime-putty production to the functions of the ready-mixed-concrete manufacturer were discussed by Norman G. Hough, former president and general manager of the National Lime Assn. He spoke on *Fitting the Lime Putty Business Into the Ready-Mixed-Concrete Industry.*

"Before one can have a good idea of the economic soundness of a lime-putty plant to-day one must have a reasonably-good understanding of what the leaking-wall problem actually amounts to, because without this problem the particular kind of mortar which is produced in a modern, up-to-date lime-putty plant would be just another mortar and, as such, would meet with the hardest kind of selling resistance. However, as one familiarizes himself with this problem, together with the terrific and unnecessary expense it has caused building owners over a period of years, one quickly will see that for a new mortar which possesses the right properties, as we know and understand these properties to-day, selling resistance is reduced tremendously."

Mr. Hough then reviewed briefly the history of leaking walls, beginning with the period, about 35 years ago, when the only material generally used for masonry mortar was a mixture of lime and sand.

"About that time builders began to use a small amount of Portland cement as a gaging material in the mortar to accelerate the hardening of the mortar. Because it worked well a theory developed, induced perhaps by the aggressive promotional and sales efforts of the cement interests, that because a little worked well, more would work better. Architects and builders then began stepping up the cement content in increasing quantities until they quickly reached that specification: 1 part Portland cement and 3 parts sand. Some builders allowed 5 or 10 per cent. lime to be used with the cement mortar, but others had been so thoroughly sold on high-strength mortars, even though erroneously and under false guidance, that they considered lime a dangerous material and refused to allow it on any of their construction sites. Waterproofing materials were first introduced about 1912," continued Mr. Hough. "Sales of waterproofings, of one kind or another, developed rapidly. That was the beginning of a recognition that there was a leaking-wall problem, but there was no need for waterproofing materials until after lime had been crowded out of the field, or its use had been reduced to such small quantities that its inherent properties were rendered ineffective. There was no leaking-wall problem 35 years ago. . . .

"Much research has been done in various well-known and reliable laboratories and to-day we know much more about the leaky-wall problem and about mortars than we did a few years ago. We now know the properties a mortar must possess in high degree if we are to be rewarded with sound, durable watertight brick-work,

and as a result of that new knowledge there is a strong, definite trend back to a lime mortar gaged with Portland cement; and as this new knowledge becomes more broadly disseminated the trend is becoming stronger.

"One of the things we have learned from these researches is the importance of workability as a highly-essential property of a mortar. It is this property which determines in large measure the type of workmanship procured in laying the brickwork, and this in turn has either a highly beneficial or disastrous effect on the extent of bond which develops between the mortar and the brick, and we now know that the extent of bond is an important factor in the development of leaking masonry. The most plastic of all building materials is lime putty. Because of that extreme plasticity and the high degree of workability which it imparts to the mortar, aged lime putty becomes the logical form in which to use the lime in making the mortar.

"Our forefathers made their aged lime putty by digging pits, slaking the lime in those pits, covering it over with earth and there leaving it for a period of weeks and months. There was no change in this method of preparing lime putty until the advent of hydrated lime about 1907. Some years after hydrated lime became a marketable product, a new means was found for merchandising lime putty. This was known as the Blue Diamond lime-putty plant, the general plan of which was to slake and screen the lime and pump it into large concrete vats for draining and aging. The capital investment required for a plant of that kind was from $75,000 to $100,000.

"One of these plants was installed in Birmingham, Ala., and after it was operated for some time the owner recognized what he considered to be fundamental defects, and it was that owner's study of ways and means to correct those defects which finally led to the present low-cost, efficient putty plant. This is known as the Brooks-Taylor lime-putty plant, and the first of these plants, aside from the patentee's own plant, was sold and installed about three years ago. Ten of these plants are now in operation in various sections of the country. These are located in Houston, Tex.; New Orleans, La.; Birmingham, Ala.; Columbia, S. C.; Washington, D. C.; Harrisburg, Pa.; Wilmington, Del.; Philadelphia; New York; and Cincinnati. All these plants, with the exception of those in Houston and Birmingham, are being operated by producers of ready-mixed concrete as supporting units to their concrete business. . . ."

Mr. Hough then mentioned the markets for lime putty and three products that can be made by a lime-putty plant equipped with sand-handling equipment:

(1) Lime mortar to be gaged with Portland cement.

(2) A lime plaster gaged with Keene's cement for the base coat of plastering.

(3) A lime putty for the finishing coat of plaster.

There is also another field of distribution in which such a plant fits, that of exterior stucco.

"For every 1,000 bricks laid in your market, wherever that may be", said Mr. Hough, "approximately 16 cu. ft. of wet-mixed mortar is consumed. The average two-story, single-occupancy dwelling of 6 or 7 rooms requires from 12,000 to 25,000 bricks, depending upon whether it is veneered or of solid masonry, and we have brick structures running all the way from that up to the government housing projects in Cincinnati which required close to 6,000,000 bricks, all of which were laid in a transit-mixed mortar. Approximately 4,500 cu. yd. of this mortar was furnished by the Richter Concrete Corp. over a period of seven months, and that was all delivered without any additional investment for delivery equipment."

On the question of merchandising methods Mr. Hough said in part:

"First, the plan followed to educate architects and builders to the new and broader understanding of the whole mortar subject and its relation to the leaky-wall problem is important for the reason that while many research data are available to anyone who wishes to make a study of the subject, relatively few architects and builders are familiar with it as yet. Secondly, on the pricing policy under which your mortar would be sold, I am a firm believer in a certain fundamental of selling to the effect that, when we have a material which is better and offer it at a price which is no higher than for the material which is to be displaced, the buyer will come to us. . . . We know now that a lime mortar gaged with Portland cement is better than other mortars on the market to-day, and we also know the reasons why it is better, consequently a correct pricing policy will bring the business. . . ."

In the opinion of Mr. Hough the producer of ready-mixed concrete is in an ideal position to make aged lime putty. He stated his reasons as:

"(1) With your present operating organizations and equipment you already are half way in the business. By that, I mean you already have practically all the delivery equipment necessary to handle a substantial volume of lime-mortar business without additional investment, and likewise you already have man power sufficient to handle this new business without adding thereto. . . . The Richter Concrete Corp. did a gross business in seven months last year of $30,000 in round figures without spending one dollar for additional delivery equipment or without employing additional labor.

"(2) You already have the sand supply. Some little rearrangement of sand bins for economical handling may be necessary. More than likely this will be a comparatively small item at most plants.

"(3) Since you already have the necessary delivery equipment, a lime-putty plant would give you an opportunity to utilize that equipment to a greater extent.

"It has been my experience that in a day's operation of a ready-mixed concrete plant everyone wants concrete at the same time. That is, from 9 to 11 o'clock deliveries are going full tilt, again from 1 to 3, and then business begins to taper off. Equipment for delivering ready-mixed concrete is expensive, and one of your reasons for the installation of a lime-putty plant for the production of mortar should be to utilize your present equipment more fully. Bear in mind that a lime mortar can be delivered any time. It is not like delivering concrete. When the contractor has his forms ready he wants his concrete immediately and it cannot be delivered before he is ready. On the other hand, if bricklaying is to begin to-morrow morning, you can deliver lime mortar late this afternoon, when your concrete business tapers off. In this respect it is different from other mortars in present-day use. Such mortars must be used as soon as mixed, whereas lime mortar can stand indefinitely without harm, either to the mortar or the high quality of brick-work after laying. It is this fact which makes it possible to utilize your equipment to the highest degree. When the contractor is ready to lay bricks he simply incorporates the proper gaging of Portland cement and it is ready for use.

"(4) You have a better satisfied group of truck drivers. As these men are paid by the hour, the day's pay of some of them stops when concrete deliveries taper off. An extra load or two of mortar will give them a longer day and add to their day's earnings. This always makes for a better satisfied and more contented organization.

"(5) In the operation of one of these putty plants there is but little actual work. One man can slake suffi-

cient lime in less than two days to fill a tank. After the tank is filled the filter valve is opened and for several days thereafter that tank needs no attention whatsoever. After that a few minutes a day meets the need until the lime is brought to the proper consistency. From there on it needs no attention. Any good man employed regularly around your concrete plant can do all the work necessary to operate your putty plant.

"(6) A plant of this kind should go a long way in supporting your existing concrete business. Conditions may be such that the mortar business for a building operation can be brought right along with the order for concrete.

"(7) The initial investment for one of these plants is low, a factor which always appeals when one is thinking of expanding his business."

In a talk illustrated with stereoptican charts R. R. Litehiser, chief enineer of tests, Ohio Dept. of Highways, told of *The Effect of Deleterious Materials in Aggregate for Concrete.*

In Ohio, according to the speaker, deleterious—that is, harmful or destructive—materials in gravel aggregate include the following: Shale; limonite, or yellow oxide of iron, $2Fe_2O_3 \cdot 3H_2O$, a common ingredient in what we ordinarily term chocolate bars or "nigger toes"; ochre or clay stained red or yellow by iron compounds; hematite, or red oxide of iron, Fe_2O_3; pyrites, or iron sulphide, FeS_2; and chert, commonly known as an impure flint. Not all cherts are considered deleterious, Mr. Litehiser pointed out later.

"The harmful effect of the deleterious materials comes about through physical or chemical change after they are made into concrete", said the speaker. "The degree of harmfulness which they may cause depends largely upon the amount of protection from weathering agencies which is afforded them by the concrete of which they are a part. A piece at the surface is readily attacked by weathering agencies, while one with a protecting layer of concrete over it—and of course the better the concrete, the more protection it affords—may not prove damaging at all under the usual weathering. Naturally, the larger the quantity of deleterious materials present, the more likely it is that there will be particles at or near the surface.

"Just how much havoc deleterious materials cause can be shown more convincingly by illustrations from experience than by any other means at my disposal. A bridge abutment has had its appearance made most unsightly by the staining effect which was produced by the oxidation of pyrite bearing gravel. Such oxidation is accompanied by sufficient volume change to 'pop-out' the thin layer of concrete over it and, once exposed to the full force of the weather, the oxidation continues rapidly until the deleterious portion has been consumed. Accelerated deterioration then ceases and normal weathering continues, with the tell-tale stain to mark the spot where the crime took place."

Abutments, or at least some of them, the speaker added, may be located where they are spared the critical gaze of the engineer who built them or of the equally critical eye of the one who pays for them, but a bridge railing parades itself before all who pass by. Because of their conspicuous location, such railings are frequently ornamental and a conspicuous blotch sticks out.

While shale frequently contains pyrite and results in damage such as the speaker described, there are numerous instances of the less glaring kind of "pop-outs", where the shale contained no oxidizable iron and no tell-tale stain remains. While less conspicuous, the occurrence is none the less undesirable and all shale particles in aggregate must be viewed with suspicion.

"In an effort to study the effect of certain deleterious materials when they are incorporated in concrete", said Mr. Litehiser, "we purposely selected coarse aggregates which we knew from experience contained more or less of the deleterious materials previously mentioned and made them into concrete specimens, 6-in. by 6-in. cylinders, which were in turn subjected to artificial freezing and thawing. A cycle of artificial freezing, as performed in our laboratory, requires 24 hr. and consists of freezing of water-saturated specimens at 0 deg., followed by thawing in water at 60 deg. to 70 deg. F. . . ."

Speaking of cherts, he said:

"As we have studied cherts, we have come to divide them into two varieties which ordinarily may be distinguished visibly. In one group we place the white or gray colored, non-waxy cherts which are readily absorbent. In the other group we place the waxy cherts, ranging in color from yellow, through brown, to black. The former we classify as deleterious. . . .

"Specifications have long imposed restrictions on deleterious materials in aggregate, particularly where it is to be used in concrete. . . . An illustration which may be even more forceful, since it involves dollars and cents of the contractor's money, is afforded by a retaining wall with 266 sq. yd. of surface exposed where appearance counted. In this area approximately one hundred 'pop-outs' of the staining variety, ½ in. to 1½ in. in size, occurred within three months after the wall was poured and before the contractor had been paid his final estimate. The contractor was required to repair the damage by digging out the offending pieces of aggregate, enlarging the holes so as to provide proper patching bond and to fill the holes with 1-2 mortar. After the repairs had been made it was necessary to re-rub the entire wall to obtain a uniform and neat appearance. The contractor estimated that the repairs cost 7½ cents per sq. yd. and, including the re-rub, 36 cents per sq. yd. Charging this back against the coarse aggregate in the wall, the repairs alone amounted to 13 cents a ton and including the re-rub 64 cents per ton. In exposed quantities like this instance deleterious materials cost money."

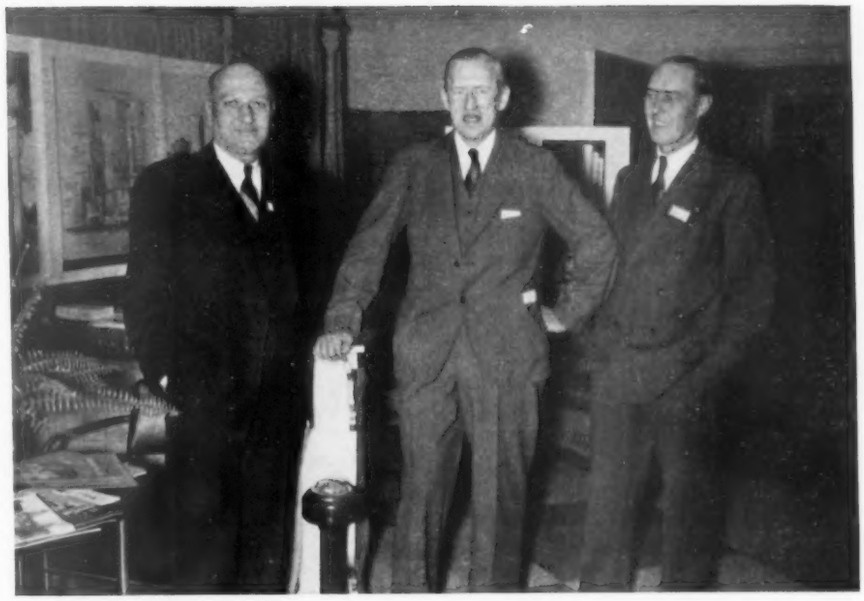
There is no royal road whereby shale, limonite, ochre, hematite, pyrites, and certain cherts may escape the deleterious classification, in the speaker's opinion. The present generally-accepted specification limitations certainly can not be made less exacting. Where unmarred beauty of surface is an architectural consideration even stricter limits are justified. Nor can the importance of any factors which contribute to the lessening of durability in concrete be minimized. This challenges the engineer and aggregate producer alike—the former to build the best concrete he can and the latter to furnish the best aggregate possible.

The Function of Industrial Research was discussed by C. L. Warwick, secretary-treasurer of the American Society for Testing Materials. On the subject of research by trade associations he said in part:

"The trade association of to-day is a powerful factor in the business and industrial world, and its responsibilities on the one hand to the members of its industry and on the other hand to business generally and to the public are great. . . . Among the various reasons for the existence of a trade association, we can surely include the function of developing for its industry a comprehensive knowledge of complete and accurate facts. Such things as business statistics relating to finance, sales promotion, production and marketing are frequently mentioned in this connection, but I am convinced from many years of observation of and contact with trade-association work that technical knowledge and the research that develops such knowledge must have an important place in the aims and activities of the progressive trade association.

"The Portland Cement Assn. affords a notable example of research

work by and for an industry through its trade association", said Mr. Warwick. "It maintains a complete cement and concrete research laboratory manned by a competent staff with supplemental facilities for field inspection and testing. The cement industry has for years devoted a large proportion of its coöperative activities to research as compared with direct sales promotion of the product. In the words of an officer of the association, the reason for this 'is found largely in the nature of the business, in which the manufacturer sells *cement* but the user wants, and in effect buys, *concrete*. The quality of the finished product—concrete—depends more upon the proportions of the mix, the mixing action, methods of placing, and extent of curing the concrete than it does upon differences in characteristics of the cement; but if unsatisfactory results are secured, the natural tendency is to blame the cement or at least to condemn the use of concrete. Hence a continuous campaign of education in the proper use of cement is necessary, and such a campaign can only be successful if based upon sound fundamental facts. By bettering each phase of the process of concrete making, then, the cement industry is promoting the use of concrete in a tremendously effective way, as evidenced by the growing use of cement. Better concrete, through intelligent use, sells more cement.' . . .



L. G. Uhl, Marion Steam Shovel Co., C. S. Wicker, Buffalo Slag Co., Buffalo, N. Y. and G. C. McCullough, Birmingham Slag Co., Birmingham, Ala.

"A few years ago I had occasion to discuss certain aspects of trade association research, and I made the statement then that the National Sand & Gravel Assn. represents another large industry that believes it should take the lead in developing information concerning its product", continued Mr. Warwick. "I am sure that statement is as true to-day as it was then, although doubtless the difficult years that have intervened have made it impossible for the industry to translate its belief into reality to the extent that it would have wished. Nevertheless, you did establish your own research laboratory and staff to study problems of interest to the entire industry, and to some extent, I understand, to serve member companies for the solution of individual problems. You have carried on many studies dealing with the effect of such factors as grading, void content, and addition of finer sizes on the strength and economy of concrete; the effect of mineral composition and shape of particles on the concrete-making properties of gravel; the properties of concrete sands; the soundness of aggregates and methods of testing for soundness; the methods of proportioning concrete; and the characteristics of gravel ballast. You have coöperated with the several technical societies in the field; the results of your researches have been published by the association and at times by the technical societies in the form of reports and papers; and in the practical application of these studies you have worked with governmental agencies, the technical societies and various groups of consumers in an effort to bring about more intelligent and efficient use of sand and gravel and to develop proper test methods and specifications to govern their application and use. In short, the association has taken what I believe is an intelligent and enlightened attitude towards research and toward coöperative relations with consumers, governmental groups and technical societies.

"And, yet, I think it may safely be asserted that all this and more is necessary. One of the most important uses of sand and gravel is in concrete. Now, much of the research in concrete has been carried on by the consumer, as for example, the Federal and state highway departments, and by research laboratories and other departments of our universities. Considering the inherent differences in the method of production between concrete and such a manufactured product as steel, this phase of concrete research is not surprising. Nevertheless, a group such as yours that stands in the relation of producer of an important component material entering into the making of concrete should be in the van of the research procession; it should yield to no one in that 'diligent search' after knowledge of its product, its properties and their relationship to use. The producer group is the only one with sufficient selfish interest in its product to investigate it comprehensively; consumer-group research usually stops when the immediate question that interests the consumer has been answered. . . .

"From my own rather limited contacts I would cite such problems for investigation as the following:

"What is the relationship between such things as durability, surface texture and volume changes in aggregates and the cracking of concrete highways? What is the effect of grading?

"How can the durability of aggregates be measured? And how can the durability of different types of gravels and other aggregates be reliably compared?

"What are the relationships between the mineral composition of aggregates and the fire-resistant properties of concrete?

"How may gravels of varying mineral compositions, surface textures and shapes of particles be properly and efficiently used with bitumens to produce the many varieties of bituminous mixtures that are finding ever-increasing applications to-day?"

The report of the sand-and-gravel association's Committee on Research was presented by its chairman, Alex. W. Dann. He made a strong plea for enlargement of the association's research work, and said:

"I would say that if we have no occasional dark colorimetric tests without knowing what it means; if

we have no clay or lignite or other substances in our deposits without a knowledge of how to get them out and how much, if any, they affect the value of the product; if we have no surplus and a perfectly good product for which we nevertheless have no market; if we have no imperfections in size or shape or hardness of particles of which the effects are not clearly understood; if we have no problem relative to balanced production; if we have no occasional adhesions on gravel without knowing the effects of them; if we have no desire to make a better concrete cheaper with a better understanding of grading; if we have never found any case in which competing materials have not maintained a preference without fully understanding the reason; if we have no lack of facts on which to base our efforts to secure business against competing materials; and if we have no curiosity as to why a structure for which we furnish material is an excellent one or a mediocre one; if, I say, we have none of these problems, some of which I may perhaps have forgotten, then by all means we should make no contribution, no investment in research, because in all probability it will be without profit to us.

"There are, of course, plenty of uncertainties facing the business and our industry now, but not to the extent of pessimism. Nevertheless, it is a period of retrenchment in an effort to save money in the business. But I think we all know that one of the surest ways to lose money is to fail to spend money at the appropriate time. for instance, you know that it loses money to delay maintenance of a plant, defer the maintenance of a plant too long. You know that it loses money if you do not spend money for a sales effort, for an intensified sales effort. I think this is a time of intensified sales effort. Finally, we certainly, in my opinion, will lose money in the industry, will fall behind, if we do not spend a reasonable and increasing amount of money for the determination of facts relative to new uses, proper uses, cheaper uses, and better uses of our product."

Stanton Walker, director of engineering of the association, closed the morning's session with a thorough discussion of *Some Engineering Research Problems of the Sand and Gravel Industry.*

Speaking of the use of sand and gravel in bituminous mixtures, Mr. Walker asked:

"Why has sand and gravel not been used to a greater extent? Perhaps I should restrict that question to gravel only, since sand, of course, has been the standard fine aggregate in sheet asphalt and other mixtures utilizing fine aggregate. . . . In broad general terms it may be said that the early bituminous mixtures most widely used, represented a refinement in water-bound macadam construction, and water-bound macadam construction depends for its stability on the interlocking of angular particles as well as on the cementing properties of the fine stone screenings used as filler. An early step in the development of bituminous mixtures, therefore, was the use of asphalt, in place of fine stone screenings, to bind together large particles of coarse aggregate which had been spread and rolled before the application of the bitumen-penetration macadam.

"There have been many modifications in bituminous mixtures since their pioneer days, but most of these developments have carried with them the inherited belief that only an angular coarse aggregate is suitable—and, for certain types of mixtures, only an angular aggregate is suitable. In a large measure the gravel industry accepted that inherited belief and did not attempt to find out in what mixtures gravel is suitable or to develop mixtures which would make the use of gravel most efficient. The sand-and-gravel industry has had little to say about the evolution of bituminous mixtures and a suitable research program would have given it something to say.

"The trend in the types of bituminous mixtures being used in recent years has been favorable to the use of gravel", Mr. Walker continued. "That trend is toward finer graded and denser mixtures, thus reducing the importance of angularity to stability. Also, large amounts of materials are being used in thin surface treatments of various sorts for which the base provides stability and where, again, angularity becomes very much less important. Further, in the coarse graded types of mixtures it is being recognized that angularity is not solely a result of crushing—natural gravels may be quite angular. While angularity was, and is, the principal argument advanced against gravel, another characteristic has been recognized in recent years which has an important bearing on the gravel industry. It relates to stone as well as gravel, and also to sand. That characteristic has to do with the adhesion of various types of bitumen to various types of aggregates and it has come to the forefront largely as a result of the great development in the use of a wide variety of cold mixes. . . ."

Mr. Walker then suggested two types of research on this problem:

(1) The effect of shape of aggregate particle on stability and durability of various types of bituminous mixtures, and (2) the effect of mineral composition and surface texture of aggregate particles on the adhesion of various types of bitumens.

Under the general heading of effect of the shape of the particle he mentioned several problems: (1) What is a measure of shape or particle? (2) What degree of angularity is necessary for developing stability of various types of coarse graded mixtures, such as retreads and penetration macadams, and what percentage of crushed particles is necessary to provide that degree of angularity for gravels of various types—very round ones to very angular ones? (3) What is an effectively crushed particle—one fractured face, two fractured faces, all faces fractured? (4) What is the importance, if any, of angularity on the durability of thin surfaces—surface treatments, seals and the like? (5) What is the importance, if any, of angularity on the stability (and durability) of densely-graded mixtures—asphaltic concretes, densely graded cold mixes, etc.?

On the use of sand and gravel in concrete Mr. Walker said:

"What causes a concrete road to crack? There are a multitude of factors, among which aggregates are only one. Traffic, concrete proportions, cross section, expansion and contraction joints, subgrade, weather conditions, cement, aggregates, and the many ramifications of these are among the multitude. . . . Concrete roads crack, of course, because the concrete is over-stressed and, with minor exceptions, over-stressed in tension, the stress concrete is least able to withstand. Pulling produces tension and bending produces tension. A combination of load and insufficient subgrade support results in binding, and either a weak subgrade or a warped slab results in inadequate subgrade support. Changes in temperature and moisture conditions result in volume changes; the concrete shrinks and swells, contracts and expands. Such volume changes may cause the slab to move along the subgrade, thus producing pulling and, or, it may result in warping, which, in combination with a load, causes bending. . . . The only important manner in which aggregates affect cracking is through their influence on the tensile strength and volume changes of the concrete; and aggregates have an effect on these two factors. They suggest two principal problems requiring study.

"What are the effects of various aggregate characteristics, other than size and grading, on the ability of concrete

to resist tension? So far as simple bending tests are concerned, a part of the answer seems clear. Surface texture seems to be the principal factor. Strength of particle plays a part. Perhaps mineral composition, aside from its effect on surface texture, has some influence. Certainly, shape of particle, within the limits of normal aggregates, is of negligible importance. It has been claimed recently that a fractured surface is beneficial because of its effect on surface texture, rather than shape. I have not seen the evidence to substantiate that claim. . . .

"With few exceptions all the tests of concrete strength, in relation to different aggregates, have been made with single applications of what are, in effect, static loads. What is the relationship between different aggregates when impact loads are applied and when there are thousands upon thousands of repetitions of load? To what proportion of its ultimate strength may concrete, made with different aggregates, be stressed repeatedly without fatigue? The information available is practically nil, and complete information may be of outstanding importance in evaluating different aggregates. . . ."

Referring to the soundness of aggregates as affected by deleterious particles, Mr. Walker said that the damage done by such particles is generally local in nature, but, if enough of them are present, progressive disintegration may take place. The "pits" and "spalls", some (not all) instances of exposed reinforcing steel, some instances of progressive disintegration of concrete road slabs, and many other examples might be cited as resulting from unsound aggregates. Further information is needed along lines somewhat as follows:

(1) What is a satisfactory method of test for soundness? The sodium-sulphate test, the magnesium-sulphate test, the freezing-and-thawing test, or others?

(2) For a given method of test what result (or results) draws (or draw) the dividing line (or lines) between satisfactory and unsatisfactory aggregates? Of course, different conditions of use and of exposure dictate different dividing lines.

(3) What types of particles, mineralogically, are sound and what unsound, and what proportion of unsound particles are permissible under different conditions?

(4) What is the relationship between soundness tests of aggregates and soundness tests of concrete?

Mr. Walker then spoke of specification standardization, saying in part:

Stanton Walker, Natl. Sand & Gravel Assn. and J. F. McCracken, American Bldrs. Supply Co., Louisville, Ky.

"Most of, if not all, the standardization that has been accomplished has had to do with grading. I believe that a most worth-while research would be to make routine determinations for a large number of aggregates from different sections of the United States, of such factors as: grading; soundness; resistance to abrasion; specific gravity; absorption; mineral composition; concrete-making properties; affinity for bitumens; and others which will suggest themselves. With that information before us we would be in a much better position to assist producers in their specification problems and to bring about a better standardization of specifications in general."

"One of the most important problems before the industry is that of improving borderline materials", Mr. Walker said further, "and particularly those which are 'borderline' because of the presence of flat, friable, soft, unsound, and otherwise undesirable particles. The laboratory could be used, for example, to determine the efficiency of such equipment as soft-stone eliminators, flat-particle eliminators, and the like. How can tenacious coatings be removed and to what degree is their removal necessary? Classification and washing methods and their efficiency probably could be studied profitably. Many deposits vary to a considerable degree within themselves as to grading, cleanness, and quality of particles. The laboratory could, it seems to me, perform a valuable service by coöperating with member companies in a survey of their deposits, the information from which should increase the efficiency of production. A controversial point in most specifications has to do with tolerances in grading—and particularly at the end points. . . . Several studies of crushers and crushing methods suggest themselves—stage crushing, circulating loads, etc.—from the point of view of shape of particle. Bin and stockpile uniformity deserve attention, as does also the uniformity resulting from different methods of loading."

Miles N. Clair, vice-president and treasurer, Thompson & Lichter Co., has been a frequent speaker on ready-mixed-concrete association programs. On this latest occasion he discussed the *Design and Control of Concrete Mixtures with Particular Reference to the Effect on Aggregates.*

Mr. Miles dealt at some length with the problems of specifications and the difficulty of getting architects to demand anything better than the arbitary proportion requirements of many years ago, which were expressed in terms of a maximum size together with a general statement of "uniformly graded from coarse to fine". The contractor working under such a specification, the speaker said, estimates costs on the basis of past experience of tables of quantities made up many years ago, probably without reference to the characteristics of the aggregates used in the particular locality. The contractor always has costs as one of his first interests and, under the type of specification being considered, the aggregate producer submitting the lowest-priced material meeting the specification will get the order. When the construction starts, the aggregate producer will supply anything he can under the specification and probably some material that will not meet the specification, but unless it becomes annoying to the contractor, because of poor workability affecting placement or poor strength affecting stripping, he will offer no objection. The compressive strength will be the only quality probably checked, but cement quality is normally so high to-day that the mixtures can be flooded without bringing the strength below structural-design requirements. The honeycombed areas will be patched and the disintegration will not show up until later. The result is eventually more dissatisfaction with concrete which can not help the market for aggregates.

According to Mr. Clair, the producers of concrete aggregates who desire to have them used to the best advantage meet with another obstacle in addition to the obsolete architect or engineer's specification and that is the building laws written, as most of them have been, twenty or thirty years ago. These laws set up properties and gradation requirements on a basis which recognizes no deviations, although they do occur, which really gives concrete with one material for

a 1:2:4 mixture inferior to a 1:2.5:5 mixture with another material. Frequently the ratio of coarse to fine is so definitely fixed and the gradation left so wide open that the strict enforcement of the law produces poor rather than good concrete, he pointed out.

Speaking of good specifications, and particularly those of the Joint Committee, Mr. Clair said that the specifications similar to those of the Joint Committee offer an opportunity so to proportion concrete as to obtain some of the advantages of aggregates of superior characteristics. They define somewhat more closely than normally the gradation of aggregates and in addition give a very desirable limitation on the variation in gradation of the fine aggregate which is desirable for control purposes. The tolerances are wisely based on the gradation of "representative sample" rather than stated as certain definite fineness moduli. The tolerance is given as ± 0.2 in the fineness moduli. A question naturally arises as to the reasonableness of this tolerance, both as to its effect on the quality of the concrete and, practically, of a well-equipped plant meeting it. It has been Mr. Clair's experience that none of the aggregate producers normally deliver material on a job even within the ± 0.2 tolerance. From the viewpoint of control of the workability of the concrete, however, the tolerance of ± 0.2 is not sufficiently close. "As an example", said the speaker, "assume that the acceptable representative sample of fine aggregate came within the gradation specifications and had a fineness modulus of 3.1. It is likely that this sand was really at the critical point in regard to the amount of material passing the No. 50 sieve. If the fineness modulus went to 3.3, there would unquestionably be a decided change in workability, necessitating a change in the entire mixture set-up. Changes in mixture can be made to take care of even greater changes in gradation, but such adjustments can not be successfully made without delaying the work where modern control is practiced, which includes keeping workability, consistency, water-cement ratio, and yield, and often cement content, definitely under control". It is Mr. Clair's experience that the tolerance in the fineness modulus of the fine aggregate must be within ± 0.1, if uniform concrete is to be produced at any plant where concrete is being batched "as rapidly as the levers can be pulled and the scales read". He has also found that the same limits are necessary for the coarse aggregate and he believes that such limits should be included in standard specifications.

Mr. Clair presented test data for five different aggregates on five different projects and offered the conclusion, drawn from them, that the average aggregates producer can without hardship furnish materials within the recommended tolerances of ± 0.1 in the fineness modulus.

The producer of aggregates must necessarily be more careful when furnishing aggregates to meet such a specification, not only as to the washing and screening but also in working his bank, according to Mr. Clair. Even if the producer desires to cooperate, he is often at a loss as to what to produce because of the divergence of specifications. The various nationally used specifications do not exactly agree, although they are constantly approaching closer to one standard. In any local area, however, the particular requirements will deviate widely. One engineer decides he wants a maximum size aggregate ranging from ¾-in., another 1-in., and still another 1½-in. for the same purpose concrete. One wants a straight-line grading on a regular-scale plotting, another a straight-line on a semi-log arithmic scale. Still another wants all the material of one size. Obviously the best for the producer and the user in the speaker's opinion is to have as few sizes as possible and a grading that will produce economical concrete and most effectively use the characteristics of the aggregates of a given district. There will be needed at least four or five sizes of coarse aggregates and two sizes of fine aggregates to meet all the possibilities in any metropolitan area. The production of three sizes of coarse aggregate will by combination allow the meeting of most specifications provided the maximum size required does not exceed 2 in. The attempt to differentiate between sizes of aggregate on the average job to gain the advantage of saving in cement content is overdone, he thinks. If the specifications are set up on arbitrary proportions, there is very little possibility of reducing the cement content. In fact, the larger aggregate may be of such a grading as to require more, rather than less, cement.

"We believe, from experience", he added, "that an aggregate grading that approaches a straight line on a semi-log plotting—that is, where the percentages passing a given sieve are plotted to a uniform scale and the size of the sieve openings to a log scale—gives the best results in concrete, considering workability as well as economy of cement. This agrees closely with the so-called ideal grading recently presented in one of the news letters of the National Sand & Gravel Assn. It is of little use, however, to set up on ideal gradation, if it can only be produced with difficulty and at a cost in excess of that of making compensating changes in the proportions. Mixtures can be designed to give concrete with all the desired characteristics with aggregates varying widely from an ideal gradation. The concrete, however, will not be satisfactory, if the aggregates vary sufficiently from load to load to affect the workability, not because of the difficulty of determining the adjustment to make but because of the lack of time to make examinations on which to base such changes.

"If the sand in a given locality naturally runs to the fine side of an ideal gradation curve and the gradation of the coarse aggregates is normal, somewhat less sand should be used; if the sand is on the coarse side, somewhat more sand should be used. The final result of deviations from the ideal curve is an increase in the cement content and a change in the ratio of coarse to fine aggregate. The change in cement content seldom is as much as 10 per cent.

"Where a sand is particularly deficient in fines, sometimes admixtures are used for the correction of this deficiency. The aggregate producer in such localities should give careful consideration to improving his material and getting the 15 to 25 c. per cu. yd. extra that goes to the admixture producer. A deposit may often be found nearby that in combination with the coarse sand will give an excellent gradation."

Concluding his remarks, Mr. Clair said:

"Good specifications, allowing proper mixture design, are wasted unless in the actual making, placing, and curing the specifications are enforced. The function of control is to see that the materials are as specified; that the water content as well as the quantities of other materials are in accordance with the mixture design or adjusted for variations in material qualities; that the workability, temperature, mixing time, and protection are kept proper. The problem of concrete quality control as related to aggregates is our principal interest here. Although trouble is often encountered due to high organic content or other defects in aggregates, these do not normally vary so rapidly as does gradation, and they do not have so immediate an effect on the visual characteristics of the concrete. The control engineer, however, must constantly be alert to detect such objectionable material and must make

check tests as a routine matter for their determination."

What was called good concrete thirty years ago would be called good concrete to-day, said Roy W. Crum, director, Highway Research Board, in his paper, *Concrete—Present and Future.*

"Of course, nowadays we know how to make that same quality of concrete more economically, out of more diverse materials and with more assurance of uniformity; but basically what we called good concrete in 1907 would be good concrete now. And furthermore, progress in methods has not been steadily upward. In that time we have gone from dry to wet mixes and back again and from measurements based on weight to loose volumes back to weights and onward to absolute volumes. True, at that time we did not actually weigh the materials, but many had a feeling that it would be the right way, if it could be managed. That was a non-existent obstacle that took years to overcome. When we finally tried to weigh concrete materials it turned out to be very simple."

On the subject of curing the speaker said in part:

"It has been found very difficult to distinguish at an early age between well- and poorly-cured concrete. Other things being equal, the range in quality is small at first and not easily measurable. Nor is it known with surety how great the range may be even toward the end of the useful life of the concrete when the maximum benefit from good curing should appear. It is evident that a method for comparing the relative values of different curing processes is greatly needed. Even more is needed a method of evaluating curing processes in general in relation to the quality of the concrete; but until more is known about the effects of the forces at work during the setting and hardening period little progress can be made toward that objective. So far we know that plenty of water after the mixture is in place is an important requirement, but what do we know about the function of water, especially excess water, in the hardening process? We should be able to analyze a sample of concrete, say at 7 days, chemically, physically, or microscopically, or all three, and tell whether or not it had been subjected to favorable influences during that period. But before it can be done means must be found to recognize the evidences of favorable conditions. Study of the functions of water and all the phenomena involved in the change from mush to rock must be continued. . . .

H. C. Peters, T. L. Smith Co.; A. C. Avril, Sakrete, Inc.; S. A. Phillips, Pit and Quarry.

"Concrete is not a homogeneous material. It is composed of a heterogeneous mass of rock particles of all sizes and mineral compositions stuck together with whatever it is that cement turns into when it hardens. All the constituents are susceptible to heat and many of them to moisture in varying degree. With every change in temperature the particles individually, large and small, change their size, so that in fact this solid-seeming concrete is continually in movement with the different kinds of particles trying to work independently. All that makes these multitudinous movements synchronize with each other and work as a whole is the binding power of the cementing medium. When thought of in this way, it seems marvelous that most concrete is so good and dependable. Portland cement is a really wonderful material.

"It is easy to see that if there is any failure in the cementing medium or in the mineral constituents, or if the forces that cause differential expansion and contraction in the mineral particles are too great for the strength of the cement, the mass will go to pieces. To learn how to prevent this with surety is an important research objective. There is probably much more to be learned about conditions that may cause cement to loosen its hold on the aggregates, but more thorough application of much that is known would prevent many failures. It is known that the leaching action of percolating water may destroy the bond between the particles, and if this result is accompanied by reaction with some chemically active constituent of the water, failure may be very swift. An elementary precaution, therefore is to use a mixture that will prevent the movement of water in the concrete; but we can hardly charge all defects of this kind to carelessness; there is too much yet to be leaned about making impermeable concrete."

The Wednesday afternoon session closed with the reports on business conditions presented by twenty producers from different parts of the country. Each report was supposed to answer the following questions:

1. What was the volume of business in your area in 1937 as compared with 1936?
2. What is the prospective market in your area in 1938? Will it represent an increase or a decrease as compared with 1937?
3. How did the price level in 1937 compare with 1936? What is the outlook as to prices in 1938?
4. What relation did volume of demand bear to capacity in your area in 1937?
5. What type of projects, such as:
   (a) large industrial structures
   (b) housing construction
   (c) large public structures (dams, bridges, tunnels, etc.)
   (d) highways and streets
   (e) railroad ballast

produced the greatest demand in your area in 1937? What was the division as between public works of all kinds and privately-financed projects?

6. What type of projects will probably produce the greatest demand in your area in 1938? What will be the division as between public works of all kinds and privately-financed projects?
7. To what extent did the public-works program in your area in 1937 depend upon emergency Federal appropriations such as W.P.A. and P.W.A.? What is the prospect for the expenditure of Federal emergency appropriations in your area in 1938?
8. In normal years do you depend heavily on privately-financed projects? If that market declined in your area in 1937 as compared with 1936, what are the responsible reasons in your judgment?

The speakers' reports will, in what follows, be epitomized, the numbers in parentheses referring to the questions listed above. Each speaker's name will be followed by a brief description of the area covered by his report.

JOSEPH H. DIXEY. (Metropolitan New York)—(1) Business declined approximately 20 per cent., most of it during the latter quarter of the year.

(2) Under the uncertainty that surrounds business in general and labor in particular this condition is definitely clarified, and an amicable policy defined and accepted by all interested parties, the immediate out-

look for 1938 is not too promising. No reason to believe that production of ready-mixed concrete will increase in 1938.

(3) Prices declined during the latter part of 1937; confined to certain types of engineering construction and not general. Impossible to forecast what the price structure will be during 1938.

(4) The production capacity increased by the entry of a new ready-mixed-concrete producer. The demand probably did not exceed 50 per cent. of the production capacity.

(5) Engineering construction (subway, bridges, sewers, tunnels and various heavy structures) again provided the bulk of volume. Street paving and state highways required a minor volume; direct government purchases about equalled 1936. Federal housing limited to two large projects. Private buildings of all types probably did not exceed 10 per cent. of all work done with ready-mixed concrete.

(6) We will again depend on public projects of all types for the bulk of our business for 1938.

(7) Probably 50 per cent. of all public projects depended upon W.P.A. appropriations; 1938 will show a marked increase in straight W.P.A. projects manned by relief labor and material purchases made by Procurement Division of Treasury Department. Amount of ready-mixed concrete used by W.P.A. in comparison to loose materials is heavily unbalanced in favor of latter.

(8) There has always been a better price structure when private building was active than when public work formed the bulk of construction. We do not believe that privately-financed projects will form any considerable part of our business during the year 1938.

PAUL P. BIRD. (New England)—(1) The volume of business in the sand-and-gravel and ready-mixed-concrete industries was probably greater by about 12 per cent.

(2) The volume in 1938 probably will be less by about 20 per cent.

(3) The price level was about the same. For 1938 it is hoped prices will not be materially lower but, with the decreased volume, it is difficult to forecast.

(4) Sand-and-gravel plants used about 50 per cent. of their capacity; ready-mixed-concrete plants probably 70 per cent.

(5) Streets and highways 35 per cent; publicly-financed structures 35 per cent.; privately-financed structures 30 per cent.; railroad ballast none; public work 70 per cent.; private work 30 per cent.

(6) Think that 1938 will show about the same proportions as 1937.

(7) To a very large extent. We have been expecting that in 1938 there would be a lesser proportion in these Federal appropriations.

(8) Our sand-and-gravel and ready-mixed-concrete industries depend largely upon privately-financed projects. In 1937 the proportion of privately-financed projects increased, due to the gradual emergence of New England from the worst of the depression years.

ROBERT C. COLLINS. (Philadelphia, Wilmington, Trenton)—(1) Our increase of central-mixed concrete was 19 per cent., sand-and-gravel sales rose 8.6 per cent.

(2) Our 1938 volume will be from 10 to 20 per cent. less.

(3) Our prices increased from 3 to 10 per cent., covering both sand and gravel and central-mixed concrete. We will lose that increase and go 5 or 10 per cent. below 1937 levels.

(4) We ran at approximately 30 to 40 per cent. of normal 1921-to-1930 volume.

(5) We have depended largely on municipal, county, state and Federal projects for part of our tonnage. We estimate that from 75 to 80 per cent. of our tonnage is public or semi-public work.

(6) Highways and streets and industrial structures and public works, including government and housing projects, will account for from 60 to 70 per cent. of our tonnage.

(7) More than 50 per cent. of our tonnage went into public-works programs; prospects for 1938 are not so good.

(8) We do not normally depend heavily on private construction for our largest tonnage.

E. S. SIMPSON. (Washington, D. C.)—(1) The volume in our area was just a little below 1936.

(2) The volume for 1938 depends very largely on what the government will build. They have two or three large projects that will probably take 200,000 cu. yd. of concrete.

(3) We got a little better money in 1937, due to a little more private building and better-spread business.

(4) We have been running fairly close to capacity for the last two or three years.

(7) Our work is normally divided fifty-fifty between government buildings, Federal government buildings, and the building of apartment houses, stores and warehouses.

(8) We would run normally 40 to 50 per cent. government buildings, large buildings; the remainder is road work, residential buildings and apartments.

E. J. NUNAN. (Western New York)—(1) Sand-and-gravel business was approximately one-third greater than in 1936.

(2) The prospect for 1938 is not so bright and a substantial decrease will probably be the experience.

(3) The price level was about the same as in 1936, and with less tonnage in prospect for 1938 an increase is hardly to be expected.

(4) The demand in the Niagara frontier section of the territory at times reached close to plant capacity,

Two views of the exhibits at the Cincinnati conventions.

while the average for the area was nearer 50 per cent.

(5) Sewer systems and disposal plants accounted for a substantial amount of the tonnage; highways and streets ranked next. Private construction was an important outlet in the earlier months of the year. Railroad ballast is a negligible outlet. At least half of the projects consuming the material were publicly financed.

(6 and 7) Publicly-financed projects are in the completion stage and unless new projects are started, this class of project may be reduced below 1937.

(8) City producers depend on privately-financed projects for much of their tonnage. Uncertainty on the part of real-estate investors of their ability successfully to carry their projects through in the face of labor demands, the uncertainty of income of prospective buyers, and the many proposals of government, the effects of which are feared, are some reasons for the lack of such projects.

In ready-mixed concrete, prices were a little better and demand was a substantial percentage of the available equipment; 1938 prospects are not as bright and are affected by the same causes as stated for sand and gravel.

RAY V. WARREN. (Western Pennsylvania)—(1) Sand and gravel increased about 2 per cent., ready-mixed concrete about 25 per cent. due to our ability to serve during this past year structures that were denied us in previous years.

(2) We forecast a tonnage of sand and gravel about equal to that of the year 1937. Ready-mixed concrete may move slightly ahead.

(3) The sand-and-gravel price level reflected a slight increase. Ready-mixed concrete showed an increase varying from 50 c. to 80 c. per cu. yd., brought about by the fact there were no commitments on ready-mixed concrete. We are going to have a little better price for sand and gravel and ready-mixed concrete during the present year.

(4) For sand and gravel we have facilities to turn out 100 per cent. more than we did in the past year.

(5) Our industrialists, particularly the steel companies, took considerable of our sand, also considerable of the ready-mixed concrete, but not so much of our gravel because they used their own flux stone for the coarse aggregate, occasionally using slag, a by-product of the steel furnace.

(6) Besides the industrialists, the durable-type pavements of the state, with a few local streets, took considerable of our prompt deliveries of sand and gravel.

(7) Our greatest aid came from the Federal highway program. This current year we will benefit considerably from W.P.A. grants to our state authority. We are now having an extensive building project, institutional building, by the state authority through grants of W.P.A.

(8) We depend heavily on privately-financed projects, but of late we are depending to a much larger extent upon the public program.

STEPHEN STEPANIAN. (Ohio)—(1) Business in Ohio was about 10 per cent. less, although many report it the same as last year.

(2) The prospective market in 1938 represents a very definite trend to decrease.

(3) The price level was the same. We don't expect any material change in prices.

(4) The relation of volume of demand against capacity in our area was approximately 60 per cent.

(5) There is very little demand for industrial structures; housing construction shows a slight improvement in the majority of cases; decidedly the lion's share was consumed by highway construction and public structures. About 70 per cent. for public work and 30 per cent. for privately-financed projects.

(6) Public works and highway construction will produce the greatest demand in our area in 1938; 75 per cent. for public work of all kinds, against 25 per cent. for privately-financed projects in 1938.

(7) About 40 per cent. The prospects for the state of Ohio in 1938 are:

State highway department		$ 33,000,000
Primary construction	$20,000,000	
Secondary construction	2,000,000	
Maintenance	11,000,000	
Country and township road and bridge funds		23,500,000
City and village street funds		10,000,000
Schools and municipal buildings		3,000,000
U. S. Treasury Dept. building program		5,400,000
Waterways, drainage and flood control		15,000,000
Waterworks, sewers and sewage plants		8,000,000
W.P.A. (counties, cities and buildings		15,000,000
		122,900,000

(8) Producers depend more on privately-financed projects than in the last few years, although some plants in isolated districts report they depend entirely on highway-construction work.

A. J. O'CONNOR. (Detroit)—(1) Commercial gravel producers report an increase of 25 per cent. in the volume of business. In ready-mixed concrete the increase has been about 10 per cent.

(2) The gravel producers predict a decline.

(3) The price level on gravel was higher than in 1936, and we do expect to be able to hold the same price. On ready-mixed concrete the price level was approximately the same.

(4) Gravel production represented about 60 per cent. of capacity. On transit-mixed concrete the average capacity for the year would run about 70 per cent.

(5) For the gravel interest, first, large public structures, such as tunnels; second, a large sewer program; third, railroad ballast. About 75 per cent. public works and 25 per cent. private. In ready-mixed concrete, first, large industrial sections; second, housing administration building program.

(6) Gravel producers believe that public works will give the greatest demand in 1938; ready-mixed will continue to come from private work.

(7) Gravel producers believe that 75 per cent. of their work came from W.P.A. and P.W.A. programs.

(8) Gravel operators depend much on public spending of state money for highways, streets, and alleys in Detroit.

H. N. BATTJES. (Grand Rapids)—(1) Our volume was approximately 20 per cent. less.

(2) We expect a slow spring with a midsummer pick-up.

(3) The price level was 10 per cent. lower; 1938 looks like a revision downward.

(4) Volume of demand was about 50 per cent. of capacity.

(5) Large industrial structures 2 per cent.; housing construction 32 per cent.; large public structures none; highways and streets 45 per cent.; railroad ballast, 21 per cent. Division between public and private works about fifty-fifty.

(6) Private construction will increase, provided the recession recedes.

(7) Twenty-five per cent. of our highway work was done with emergency money; the remainder was normal Federal aid. Federal emergency appropriations will continue.

(8) Privately-financed projects declined due to the labor unrest in the early part of 1937 which to a large extent deprived the working class of money which they had planned to use in the spring and summer for repairs and small construction work around their homes.

R. E. WEAVER. (Northern Illinois)—(1) We did 25 to 30 per cent. less.

(2) A decrease in tonnage generally of possibly 25 per cent.

(3) Prices held with those obtained in 1936; it would appear prices

should remain at about the same level.

(4) Volume did not come within 50 per cent. of the capacity of existing commercial plants.

(5) A breakdown of available figures indicates:

(a) Large industrial structures	5 per cent.
(b) Housing construction	8 per cent.
(c) Public buildings, dams, bridges	9 per cent.
(d) Highways and streets	58 per cent.
(e) Railroad ballast	20 per cent.

(6) Township, county and Federal road projects will produce the greatest demand in 1938. Approximately 70 per cent. will be public works.

(7) From 25 to 50 per cent. of the tonnage originated with W.P.A. or P.W.A.

(8) To a great extent, possibly 40 per cent.

H. F. THOMSON. (St. Louis)—(1) The volume of ready-mixed concrete declined possibly 15 per cent., but the total amount of sand and gravel shipped, including the portion going to highway construction, increased possibly 15 per cent.

(2) The market for 1938 indicates a decided decline.

(3) There was a decided increase in the price level for sand and gravel during the summer of 1937; the market has maintained this increase fairly well, but the price level for sand has dropped back to about the same as prior to the increase. There was a nominal advance in prices of ready-mixed concrete.

(4) Roughly the volume of demand last year represented approximately 50 per cent. of operating production capacity in both the aggregate and the concrete lines.

(5) Approximately 60 per cent. came from public works of various types; in the aggregate field the influence of public works was even greater.

(6) The principal demand for both concrete and aggregates will come from private construction, possibly in the proportion of 60 per cent.

(7) The expenditures for public works depended largely upon the emergency Federal appropriations. Prospects are that there will be a very decided decrease in such expenditures during 1938, due to the absence of new W.P.A. projects and also due to the tendency for W.P.A. funds to be used on work which requires only nominal purchases of materials. Ready-mixed concrete has suffered more from change of policy in connection with W.P.A. work than have sand and gravel.

(8) Both concrete and aggregates depend heavily on projects which are financed privately.

H. F. CALDWELL. (Louisville, Ky.)—(1) Slightly under.

(2) Should be a little variance.

(3) Prices the same but better stabilized. Prospects for continued stabilization good.

(4) Demand about 50 per cent. of capacity.

(5) Highways and streets about equalled public structures, the demand in either case being in excess of the demand created by private construction. Public works largely in the forefront.

(6) Highways and streets and public structures; two-thirds and one-third.

(7) Almost entirely. The 1938 program, if carried out, will be quite a factor in creating a demand for sand and gravel.

(8) Yes. Early in the year residential construction was almost entirely throttled because of the flood, home-building contractors devoting most of their time to repairing homes damaged by the flood.

W. JESS BROWN. (Nashville, Tenn.)—(1) The volume of business was approximately 25 per cent. less.

(2) The 1938 prospects are for about the same tonnage; if there is any change, it will be a small increase.

(3) The 1937 price level was slightly higher, and 1938 should compare favorably with last year.

(4) The 1937 volume was approximately 25 per cent. of capacity.

(5) There were no outstanding projects of any size. The average ratio of public works to private projects was about 3 to 1.

(6) Prospects at this time are too vague to hazard more than a guess. The division between public works and private projects will remain about as in 1937.

(7) P.W.A. and W.P.A. spent more money on public works than was spent on highway projects, but the latter yielded sand-and-gravel producers the greater tonnage. Present prospects are that less Federal emergency funds will be sepnt during 1938 than were spent last year.

(8) Normally 50 per cent. of our business comes from privately-financed projects, with some producers showing as little as 25 per cent.

P. W. GIFFORD. (Texas)—(1) Our volume was 20 per cent. less, due to the almost complete closing of railroad ballast, and another cause the closing of highway construction in Louisiana.

(2) For 1938 our volume is to be about the same, because of the highway program.

(3) Our prices are 10 per cent. lower, due to local pits and one big producer outside our area trying to dump in our area.

(4) Our volume was about 40 per cent. of capacity. The ready-mixed was better because they did a good job of selling.

(5) Federal-aid highways are the biggest part of our business. We figure 80 per cent. for all public works.

(6) We are depending this year in a large measure on Federal-aid highways.

(7) We have estimated 20 per cent.

(8) We have depended on private business for a great part of our business.

HERBERT JAHNCKE. (New Orleans)—(1) Our volume of business increased at least one-third.

(2) Prospective market for 1938 is very good and should represent an increase over 1937.

(3) Price level was approximately the same, and we don't anticipate any change in 1938.

(4) We operated our sand-and-gravel plant at approximately 50 per cent. capacity. Our ready-mixed concrete went pretty close to 100 per cent., and we were forced to buy some new equipment.

(5) Highways and streets, together with highway construction, produced the greatest demand in 1937. The division between public works and privately-financed projects was approximately half and half.

(6) We are now starting on a $12,000,000 hospital job in the city and we have prospects of getting a Federal slum-clearance job and a new Federal post-office in the city, which makes a very good outlook for 1938. The division during 1938 should be approximately 75 per cent. public works.

(7) The Public-works program depends almost entirely upon emergency Federal appropriations and should be about the same in 1938.

(8) In normal years we depend most on privately-financed projects, but our prospects for the future will be almost entirely public-financed.

JOHN PRINCE. (Kansas City, Mo.)—(1) Our volume was about the same.

(2) We are estimating a decrease of 20 per cent.

(3) Prices were about the same.

We have no definite information on the other questions, but my guess is that the conditions in our area would correspond very closely to the average of those represented by the reports

from the areas between the Allegheny Mountains and the Rocky Mountains.

J. L. SHIELY. (St. Paul, Minn.)—(1) Sand and gravel 70 per cent. of 1936; concrete 50 per cent. of 1936.

(2) Decrease. Decrease.

(3) Increase of 10 per cent. on sand-and-gravel prices; increase of 3 per cent. on concrete prices. Prospects are for decrease in 1938.

(4) Thirty per cent. of capacity on both sand and gravel and concrete.

(5) Greatest demand in public works. Private work about 20 per cent. of public.

(6) Largest demand in private work for 1938; 75 per cent. private, 25 per cent. public.

(7) Practically all public work depended on emergency appropriations, as all city, county and state funds for improvements are spent for direct relief.

(8) We depend heavily on both publicly- and privately-financed projects. Reasons for decline in 1937:

Public work:—(a) Spending of local improvement funds for direct relief; (b) operation of sand-and-gravel plants by W.P.A.

Private work:—(a) High taxes (local, state and Federal), (b) general labor unrest, (c) increased cost of building, (d) improvements only made where necessary or where immediate profit can be seen. No long-range planning can be done, due to lack of definiteness in congressional attitude towards business.

H. F. G. PELSUE. (Southern California)—The volume was over 1936. We are anticipating a decrease during 1938.

Public works during normal years ran about 40 per cent. of the total. I think perhaps they are running as much as 60 per cent. of the total now.

I think the private market has possibilities of increasing in 1938 over 1937.

F. P. SPRATLEN, JR. (Denver, Colo.)—(1) Volume has been about 25 per cent. lower.

(2) Volume may go even lower than in 1937.

(3) Price level was 4½ per cent. lower; we hope to raise this during the current year.

(4) Demand was about one-third of the capacity.

(5) In the order named: large public structures; highways and streets; large industrial structures. The division between public works and privately-financed projects 75 and 25 per cent., respectively.

(6) The division between public and private projects will remain about the same.

(7) We naturally have depended heavily on privately-financed projects.

CHARLES M. CADMAN. (Northern California)—(1) The volume of business increased 15 per cent., with price levels approximately the same.

(2 and 3) The outlook for 1938 appears to be possibly lower prices, with the volume remaining approximately the same as in 1937.

(4) The volume of demand was about 40 per cent. of the capacity of the sand-and-gravel producing plants.

(5) This tonnage was being used mainly on large public structures, 50 per cent. on public works and 50 per cent. on privately-financed projects.

(6) During 1938 the greatest demand will be from publicly-financed work; we estimate 50 per cent.

(7) The public-works projects were financed approximately 50 per cent. by emergency Federal appropriation; expect the same situation in 1938.

(8) We depend heavily on privately-financed projects, but this market declined considerably due to the fear of the general public of the continued propaganda on high building costs, which evidently is not warranted.

V. P. AHEARN, executive secretary, then attempted to summarize these reports. His *resumé* is greatly condensed in what follows:

(1) The volume of business in the sand-and-gravel and ready-mixed concrete industries in 1937 was about the same as in 1936.

(2) For the first six months of 1938 the expectation of those who have reported is that there is going to be a decline somewhere around 15 to 20 per cent., but all felt that if this recession should be arrested and there should be any increase whatever in general business conditions, there is at least an even chane that 1938 will equal 1937.

(3) The price level in 1937 was about the same as in 1936. The outlook for 1938 seems to be for a slight decline.

(4) It is the opinion of those who reported to-day that demand represented about 50 per cent. of volume. That was less true in the ready-mixed-concrete industry than in the sand-and-gravel industry.

(5) Public works continue to be principally responsible for the business of the sand-and-gravel and ready-mixed-concrete industries.

(6, 7 and 8) In 1938 we are going to have to lean very heavily on the shoulders of publicly-financed projects. Practically every speaker reported a tremendous accumulation of demand for private construction.

The last independent session of the gravel convention opened on Thursday morning with a paper, *The Field for Sand and Gravel in Bituminous Mixtures*, by Bernard E. Gray, chief highway engineer of the Asphalt Institute. It was the speaker's desire to discuss some of the variables that must be considered in using different kinds of aggregates.

"One quality which is not covered at all by routine tests is the matter of adhesion of bitumen to aggregates", said Mr. Gray. "The adhesion of bitumen to aggregate is due to one or more forces: mechanical, chemical and electrical. Strictly speaking, they may be all electrical. A good example of the mechanical bond is a piece of lava, where the small holes are filled with asphalt and these plugs hold the film in place much like a series of mortised joints. The chemical bond is evident in the reaction of a coating with the particle to form a new compound which is held strongly to both aggregate and coating. The electrical bond is due to the attraction of molecules of opposite charge in the aggregate and the coating.

"The mere lapse of sufficient time after coating will frequently bring about molecular reörganization so that a good bond is provided. Thus, with certain aggregates storage in stockpiles or windrows for several days before spreading will result in a surface completely resistant to water, whereas if immediately spread and subjected to rainfall, stripping might occur. The addition of suitable corrective agents, chemical or otherwise, are sometimes effective. . . .

"It makes little difference if one aggregate has a value, let us say arbitrarily, of 100 and another a value of 75, in a situation where the ultimate strength required is not over 50. In this instance either one of the materials should be purchased on the basis of initial cost. If, however, the service requirement is 85, then obviously the material having the value of 75 must be used either in a new way so that sufficient strength will be developed, or the material naturally having the higher value will be the more economical to use. This situation obtains not only as between different kinds of aggregates but also between varieties of the same aggregate. Neither stone, gravel or slag respectively are as a class of the same quality within themselves. . . ."

Soil-stabilized road bases have a number of advantages over other types of foundations, according to Mr. Gray.

1. They behave more nearly like the natural soil in respect to expansion and contraction and are therefore less liable to rupture than other types of foundation which are more radically different from the natural soil.

2. Because the voids are so completely filled, intrusion of subgrade soils is practically eliminated. Therefore, there is little weakening of the bond between the coarse aggregate particles during the wet seasons of the year.

3. Due to the homogeneous character of the base, load transmission is uniform over the entire surface, so that settlement at any one point is practically prevented.

4. A stabilized base 6 in. in thickness is unquestionably superior to a non-stabilized base 8 to 10 in. in thickness.

5. They are usually cheaper.

"A questionnaire a year ago indicated that the trend was quite definitely in the direction of plant-mix", Mr. Gray continued. "At the same time comment indicated that road-mix was cheaper and if equipment were developed which would overcome some of the difficulties in road-mix, such as tendency to segregation, incomplete mixing and streaking, the road-mix types often would be preferred because they are cheaper. The improvement in road-mix equipment appears to be taking place so that where conditions of handling traffic are not critical, the road-mix undoubtedly will be continued in large volume. Some of the new mixing equipment for road operations approximates plant-mixing very closely and permits the use of high viscosity asphaltic products so that almost immediate compaction may be required. . . .

"One thing, however, has been learned in all of this work, viz., the desirability of controlling proportions. Hence the use of commercial-sand-and gravel aggregates is preferable to bank-run materials when economically available. It is hard to understand the attempt to make a gravel aggregate serve in a macadam-aggregate type of construction unless the natural or crushed character of the gravel is so suited, when in the dense-graded type they are particularly fitted because of the ability to proportion the coarse aggregate and sand sizes in the desired amount. This is particularly true in the traveling plant operations or in the traveling pug-mill type of road-mixer, and it is earnestly recommended to this group that they investigate the possibilities of the dense-graded type of road-mix as a commercial proposition.

"Most specifications have provided that the use of gravel in hot-mixes be predicated on the crushing of such material and the presence of a minimum fraction of crushed particles. Furthermore these gravel fractions often have been limited to the smaller sizes. . . . The criterion of suitability of an aggregate is not its ability to pass a sieve of a given diameter but of its behavior in the final mixture. There should be neither use or exclusion of any aggregate simply because it falls within such a category. Some rock is harder than other rock, also it may break into different shaped particles even though passing the same diameter sieve. The same thing is true of gravel; some gravels are softer than others, even though they show the same total percentage of wear or pass the same sieve. The true criterion is ability to withstand service in the final mixture, and to develop the necessary stability and durability under traffic. Some gravels are inherently extremely hard, their shape is conducive to high stability, and certainly full utility should be made of such materials where economically available."

O. W. Merrell, consulting engineer, told the audience about *Roadcrete—Controlled Plant-Mixed Stabilized Aggregates.* This material is a stabilized aggregate carefully designed and graded by sieve analysis, the bond being secured by the use of a clay soil binder, and flake calcium chloride being added to control the moisture content.

"There is among aggregate producers a rather common and, in my mind, erroneous contention that permanent pavements should be discouraged because of a resulting loss to them of a large tonnage in maintenance material which would have been necessary on the loose gravel type of highways", said Mr. Merrell. "I do not believe any manufacturer in any line of business can be ultimately successful in attempting to succeed by impeding progress and by fighting against that which is ultimately the most economical and convenient to the consumer and user. In this particular case, we believe that if a low-maintenance-cost road is built, the money which would ordinarily be used by the government to maintain a loose-gravel highway will be used in extending the primary and secondary highways system, thus opening for potential improvement a vast mileage of tertiary roads. . . .

"Stabilized aggregates definitely open up to the sand-and-gravel producer a tremendous market for roads and streets of moderate traffic and in base-course construction on high-traffic pavements both in rural and urban areas which it has hitherto been impossible for them to reach. Also, the production of a stabilized mixture affords an exceptionally practical way to utilize materials that in some areas are not readily marketable. It includes the use of all sizes of aggregates, each small size being used to fill interstices formed by larger aggregate. This creates an outlet for materials, such as small-size gravel and coarse sand, which heretofore have been wasted. . . .

"The officials of Roadcrete, Inc., realizing these facts, began an investigation of plant-mixed methods some time ago. They visited plants then in operation in other parts of the country and studied the potential market before deciding to go forward with the construction of a plant of their own. . . . They discovered that highway officials throughout the middle-west were rapidly coming over to the specifying of plant-mixed stabilized aggregates for all types of work; for base courses, maintenance material, berm work, and almost every other condition in which aggregates are being used. They felt that if they were to keep abreast of the time and be able to supply demand as it developed, they must at once begin the construction of a central-mixing plant for stabilized aggregates. After the study of plants now in operation and considerable experimentation, the plant from which they now produce 'Roadcrete' was built at Newtown, O., adjacent to Cincinnati. . . . A complete description of this plant will be found in the January, 1938 issue of PIT AND QUARRY. . . .

"The Michigan State Highway Department in December let contracts for some 300,000 cu. yd. of stabilized gravel for 1938 maintenance requirements on state roads alone", continued the speaker. In the same state contracts have been let for this year's construction for 185 mi. of stabilized base courses, using 230,000 cu. yd. of gravel, stipulating that the material must be plant-mixed. Minnesota, Iowa, Indiana, Ohio and Pennsylvania have built many miles of stabilized roads and their programs for this type are increasing substantially every year."

Gravel for Railroad Ballast was discussed in detail by the association's director of engineering and research, Stanton Walker. He listed the desirable characteristics of a high-grade ballast as:

1. The particles should be sound and durable in order to resist disintegration by the weather.

2. The particles should be sufficiently hard and strong to resist being crushed by the static and impact loads of railroad traffic.

3. The ballast should be graded uniformly enough to provide uniform support and insure a smooth-riding track.

4. The ballast should be of such a nature and graded in such a manner that it will be stable and offer resistance to shifting, so that the track will stay in alignment.

5. The ballast should be graded in such a manner that it will afford thorough and ready drainage, in order that surface water will be carried away quickly.

6. The ballast should be clean and dustless to insure a clean track and clean trains and also to avoid clogging of the void spaces and thus lessening its efficiency for drainage.

7. Ballast should be graded in such a manner that it will not foul readily, since when it becomes fouled it must be cleaned or replaced to maintain drainage.

Mr. Walker then quoted the current specifications of the American Railway Engineering Assn. as providing that:

"It will be observed that three classifications are provided for depending, for want of a better tangible measure of angularity, upon the percentage of crushed particles", said Mr. Walker. "Gravel containing a relatively large proportion of angular particles does not need the finer material to provide stability. Its angularity assures an interlocking action of the individual particles on being compacted into place. Rounded gravel, containing few or no angular particles, requires the finer sizes introduced into the voids to provide stability and to avoid a 'ball-bearing' action and a shifting track. . . .

"As to cleanness, the A.R.E.A. specifications limit the amount of material finer than a 200-mesh sieve (principally dust) to 1 per cent., clay lumps to 0.5 per cent., and soft and friable particles to 5 per cent. These requirements are not inconsistent with those in specifications for other high-type uses, such as concrete, etc. As a measure of soundness and durability the A.R.E.A. has adopted the sodium-sulfate test as outlined in the test methods of the A.S.T.M. No specific limits are placed on the amount of disintegration which may result from that test, but it is pointed out that a 15-per cent. limit or less is frequently specified for concrete aggregates, thus, by inference, recommending some such limit as this. The modified Deval abrasion test for gravel is specified as a measure of hardness. Here again no limitations are specified, but attention is called to the limits frequently included in other specifications of 15-per cent. loss for rounded gravel, and 25-per cent. loss for gravel consisting entirely of crushed particles, with the intermediate limits depending upon the proportion of crushed particles. The specification states that the percentage of crushed particles shall be determined for the material coarser than a No. 4 sieve and that a crushed particle shall be considered as one having one of more faces resulting from fracture.

"The specifications of the A.R.E.A. also include requirements covering pit-run gravel", the speaker said further. "These refer principally to grading and are approximately the same as those in effect for all gravel prior to 1926. They read: Pit-run gravel for ballast shall be classified as Grade A or Grade B in accordance with the following limitations:

Sieve Size (square openings)	Amounts Finer Than Each Size (Percentages by Weight)	
	Grade A	Grade B
2½ in.	97 to 100	97 to 100
No. 4	20 to 55	20 to 65
No. 200	0 to 2	0 to 3

Reports from railroads should be considered as highly pleasing to the gravel industry, although, of course, they are not all uniformly good, Mr. Walker pointed out. The studies of the committee over a period of years indicate, in Mr. Walker's opinion, that an increasing number of railroads are using prepared-gravel ballast and also that an increasing number of them are modeling their specifications after the recommendations of the A.R.E.A.

Prepared gravel for ballast shall be graded from fine to coarse within one of the sets of limitations in the following table, depending upon the percentage of crushed particles:

Size of Square Opening Sieve	Percentages Passing Each Size					
	0% to 20% Crushed		21% to 40% Crushed		41% to 100% Crushed	
	Max.	Min.	Max.	Min.	Max.	Min.
1½ in.	...	100	...	100	...	100
1 in.	100	80	100	65	95	60
½ in.	80	50	75	35	50	25
No. 4	40	20	35	10	15	0
No. 8	35	15	10	0	5	0
No. 16	25	5	5	0	...	...
No. 50	10	0	...	...	...	...
No. 100	2	0	...	...	...	...

Ten gravel producers reported on local specification problems. One of them, B. E. Neal, president, Neal Gravel Co., Mattoon, Ill., made some arresting remarks on the subject of particle angularity. He said in part:

"During the last five years I have watched carefully the building, use and durability of bituminous roads in five states near us. As a result of this I am prepared to say that angularity of materials adds nothing to the durability or the stability of these roads and the requirements of angularity only serve materially to increase the cost of building roads in our territory. A certain amount of angularity is not particularly detrimental, provided there is sufficient partially rounded material in the aggregate to carry the traffic.

"The State of Indiana began building bituminous roads about five years ago. At first the roads were built of crushed stone in the vicinity of stone plants and out of 1-in. to ¼-in. gravel without crushed specifications in the territory served by gravel plants. The first roads built, of course, showed some failures, but my investigation convinced me the greater percentage of the failures were failures of base and had nothing to do with the type of aggregate used.

"In the spring of 1935 the Highway Department in Indiana developed specifications requiring 35 per cent. or more of the material used to be crushed material; then in the spring of 1936 they began specifying aggregates 95 per cent. or more crushed on all surface work. Thus, we have been able to watch during the last five years the durability under traffic of roads built with these types of material. We now feel that we are in position to prove to our engineers that angular material, if an excess of ⅓ of the aggregate used, is actually detrimental to the durability of the road.

"Engineers have generally overlooked the effects of suction and tractive impact of the automobile tire under present loads and speeds. Crushed materials present to the tire either a sharp angle, which receives a concentrated tractive impact or kick from the tire, or a flat surface which receives the maximum suction developed by the tire. Uncrushed, partially-rounded aggregates present a rounded surface to the tire and minimize both suction and tractive impacts. Below the surfaces the vertices of crushed material, which are weakened by the crushing of the material, break, allowing movement of the mass

under the weight of the traffic which results in a tendency to corrugate or, as we say, 'washboard'. This tendency is a general characteristic of all roads built entirely of crushed material. The older roads built of uncrushed gravel and those built of gravel containing 35 per cent. crushed material are very generally smoother and show less evidence of movement of the aggregate in the base under traffic. Rounded or partially-rounded materials of uncrushed gravel find quickly their position in the mass under the roller and as there are no sharp edges that have been weakened in the crushing there is less breakage of the aggregate under traffic and consequently less movement of the aggregate in the mass. These semi-rounded aggregates are held by the bitumen in the position they acquire under the roller and there is a minimum of movement under traffic. For instance, in the older roads you can find many of the larger (rounded) stones that project above the surrounding surface and have stayed there for two or three years under traffic, although only partially imbedded in the bitumen.

"I believe that the specifications for bituminous resurface material should be all passing a ¾-in. screen with at least 75 per cent. passing a ½-in. with 0 to 5 passing a ¼-in. The road at the proper time should have a seal-coat of material ⅜-in. to ⅛-in. or ¼-in. to ⅛-in. with probably 15 per cent. to 20 per cent. of sand passing a ⅛-in. sieve. We believe that such a material will produce a seal-coat surface much smoother and with higher non-skidding properties than road surfaces composed of coarse material. The small pebbles and sand in these seal-coat specifications will serve to make a sand-paper finish to which the tire clings instead of being bounced over rough surfaces composed of larger aggregates. . . .

"From the observations I have made of the use of soil stabilization for a base of black-top road I am convinced that it is an inefficient and an uneconomic engineering practice. Stabilized roads containing calcium chloride or sodium chloride are based on the theory that the use of the chemicals maintains or attracts sufficient moisture to make the clay admixture a stabalizing influence. When a black-top surface is put on such a base, the normal evaporation from the road is eliminated and the chemicals do not prevent an excess of moisture from penetrating the mixture from below. In our section of the country, with freezing and thawing in the winter and spring, I believe that stabilized bases under a black-top surface receive such excesses of moisture as will turn the clay mixture into a lubricating agent instead of a stabilizing one and that this is the reason for the apparent subsidence and partial failure of these bases.

"It seems to me that the best bituminous roads in Indiana are those that have been built as stage construction using ordinary sand and gravel with light oils and traffic compacted for a year or two and finally covered with a normal bituminous surface. Such roads appear to be of a much cheaper construction and I believe actually form a base superior to the stabilized roads."

At the business meeting which followed the specifications discussion J. Rutledge Hill, vice-president, Gifford-Hill & Co., Inc., Dallas, Tex., was elected president of the sand-and-gravel association, succeeding Alexander Foster, Jr., Paul P. Bird, president, Boston Sand & Gravel Co., Boston, was elected vice-president. H. S. Davison, secretary-treasurer, was reëlected. Charles M. Cadman, M. A. Neville, George W. Renwick and John M. Settle were also reëlected to serve with the officers and Stanton Walker, director of engineering, and V. P. Ahearn, executive secretary, as members of the executive committee. The membership of the board of directors is shown in the accompanying list.

A separate meeting was held Thursday morning by the National Ready Mixed Concrete Assn., with H. F. Thomson, General Material Co., St. Louis, Mo., presiding. *Developing New Markets for Ready-Mixed Concrete* was the subject of the first address by W. D. M. Allan, director of promotion, Portland Cement Assn. Mr. Allan pointed out the similarity of interests of these two associations, both of which are working to create a larger market for concrete. He then stressed the necessity for creative selling to develop new uses and users of ready-mixed concrete and broaden the market base instead of depending on large jobs immediately available. Businesses with many outlets, even though they be small, suffer less in times of slump.

An example cited was brought to light by a national housing advertising campaign conducted by the P.C.A. The many thousands of inquiries received were forwarded to concrete-products men as leads for business. When field men checked up on these leads, it was found that many producers paid no attention to them but concentrated their efforts on the comparatively few larger orders available. When P.W.A. resources were withdrawn the number of large jobs was reduced and this market became unimportant.

In attempting to estimate the local demand for a product, Mr. Allan warned, it must be remembered that general averages and curves for the entire country or large regions are only significant as indicators. Any small area may run counter to or far ahead of average trends, so local conditions must be considered. Quoting the speaker:

"There seems to be fair agreement that the total volume of construction business for the first half of 1938 will be below the corresponding period for 1937, also that there is likely to be a resumption in the latter half of 1938 sufficient to bring the total for the year above 90 per cent. of the 1937 total. Conservative estimates of prospective construction indicate that one- and two-family houses will show some increase, not more than 10 per cent., above 1937. Again, these are nation-wide averages, and what may happen in St. Louis, Detroit, Minneapolis or New York may far outrun the national trend or run counter to it.

"Whether the volume of housing develops rapidly in 1938 or is delayed one or more years in any particular market, the fact remains that the backlog of unfilled small-house business is by far the largest in the building field and must sooner or later account for a tremendous volume.

"Along with new-house construction will come an increasing volume of remodeling and repairs, not spectacular business in 1,000-cu. yd. orders, but in a total worth-while volume for those organizations equipped to 'cash in' on it. In some communities it may be a case of getting this small-unit business or getting no business at all."

Personal selling, according to the speaker, is not an economical way to reach this small-unit market, chiefly because of the large number of prospects, each of whom has to be sold on the advantages of ready-mixed concrete. Among the more common forms of mass-selling tools to reach this market are personal letters, printed matter, newspaper advertising, etc. Mr. Allan expressed the willingness of his association to coöperate in the preparation of a series of letters, booklets and circulars to be used for local selling of ready-mixed concrete. Suggested copy for local newspaper advertising is also available. Coöperative advertising, where there is more than one producer in an area, is suggested in order to develop a market, but individual advertising is recommended where the market has been reasonably well developed.

Continuity of advertising, said Mr. Allan, is necessary for its success. He also advised that producers be pre-

pared in advance to receive many inquiries from persons who are distinctly not prospects. He divides inquiries into three classes:

(1) Hot leads requiring immediate personal contact;

(2) Possibilities, requiring the mailing of a booklet, a telephone call from a salesman when he is in the territory; and

(3) Useless—forget them.

Many suggested methods for developing the markets for ready-mixed concrete were suggested and all these require that a producer take an active interest in the improvement of building specifications, zoning ordinances and other existing regulations, as such improvement almost invariably increases the demand for his product. The promotion of concrete in house building is also considered important and the success of the P.C.A. in promoting concrete first floors for residences was cited as an example. In conclusion Mr. Allan laid emphasis on the fact that the cement industry and the ready-mixed-concrete industry must devote a considerable amount of their time to creative selling and broaden their market base.

In the ensuing discussion one producer said that newspaper advertising sold ready-mixed concrete to small individual users who know little or nothing about this product or how to use it and later blame the producer if results are unsatisfactory. Another producer from a large city said that newspaper advertising has made the public concrete-conscious and that the three large producers in that city were planning to form an association for joint advertising and selling. A third producer advised selling to small users only if one placed and finished the concrete. Another suggested that producers strengthen their standing with contractors by passing on to them tips on new construction resulting from advertising. Still another said that protection against termites was a good selling argument for concrete in territories afflicted with them.

Mr. Allan warned the assembled producers to get as good a foothold as possible at once, as a building "boom" is inevitable and will bring with it the "gyp" contractor and concrete producer as did the last "boom". A thorough educational program to establish his product in the confidence of the public and builders in his territory will make it difficult for any such competitor to get a foothold.

The next speaker was R. C. Collins, sales manager, Philadelphia retail division, Warner Co., Philadelphia, Pa., who discussed *Merchandising Ready-Mixed Concrete*. According to Mr. Collins, the Portland Cement Assn. has been promoting the use of concrete for about 35 years, but it was only after the advent of the ready-mixed-concrete plant about 16 years ago that this material could be sold as a finished product. The problem of the industry, therefore, is that of selling a new method and technique of manufacture and delivery of an accepted product, rather than that of introducing a new product.

According to Mr. Collins, his company realized that unless it could offer a consistently-better concrete of truly greater value than that previously available, there would be little chance of obtaining wide acceptance of its product. Adherence to these principles made it possible to develop a business which produced about 2,000,000 cu. yd. of central-mixed concrete in the past seven years. The first step in establishing this product was the employment of an independent laboratory organization to maintain independent inspection and testing control over the production of this concrete. This certification was signed on each ticket and created confidence in the minds of customers. He then went on to describe the company's efforts to establish its product by means of bulletins, contact with engineers and architects, and by getting it in the local specifications.

The speaker stated that ready-mixed concrete is not always better than that produced on the job by a contractor but that it is always uniformly good, while job concrete is subject to wide variations in quality. The most difficult problem encountered was that of selling the contractor on the benefits of central-mixed concrete to him. These advantages, briefly summarized, are: consistent uniformity, greater plasticity, the possibility of larger pours, reduced labor costs, service, lower placing costs, and a predetermined, accurate cost per cubic yard. "That these benefits are worth more to him than they cost him has been evidenced in the Warner Co. markets by the high percentage of contractors who continue to use central-mixed concrete on highly-competitive jobs. We aim constantly to keep these facts before the contractor, through bulletins and our company publication sent by mail and through salesman-contacts. All these always stress "buyer benefits" rather than price. Regardless of all our efforts, however, price is continually a factor.

"We have asked 'What is a profitable price and how is it established?' In our case the list price of central-mixed concrete is based on the cost of the dry materials delivered to the job in truckload lots plus a fair estimate of the contractor's cost of plant handling and mixing on the job. To this figure a profit is added commensurate with the higher delivery cost of central-mixed concrete and the 'buyer benefits'.

"On large jobs due recognition is given to economies that can be effected by carload purchases of dry materials and lower plant cost per cubic yard. A quantity discount from the list-price is allowed. In Philadelphia these discounts are as follows:

"On jobs up to 500 cu. yd., list price.

"On jobs of 501 to 2,000 cu. yd., 40c off list.

"On jobs of 2,001 to 4,000 cu. yd., 80c off list."

Mr. Collins also called attention to the necessity for maintaining prices above the dry-material plus job-mixing costs because of the demonstrated added benefits of ready-mixed concrete to the contractor. A sound policy is to seek a reasonable percentage of the available business at a profitable price and to increase this business by service, quality and equal attention to both large and small jobs. In closing he stated that the coöperation of the National Sand & Gravel Assn. and the National Ready-Mixed Concrete Assn. has been of great value to his company. Several producers took part in a discussion of merchandising methods which followed.

Next on the program was the election of officers and directors of the National Ready-Mixed Concrete Assn. Paul B. Bird, president, Boston Sand & Gravel Co., Boston, Mass., chairman of the nominating committee, read a list of the nominees, who were elected without a dissenting vote. The new officers are: President, J. F. McCracken, American Builders' Supply Co., Louisville, Ky.; vice-presidents, J. H. Dixey, Transit Mix Concrete Co., Inc., New York, N.Y., and H. F. G. Pelsue, Graham Bros., Inc., Los Angeles, Cal.; secretary, A. J. O'Connor, Koenig Coal & Supply Co., Detroit, Mich. A complete list of the new officers and the directors appears elsewhere in this article.

Before adjourning the meeting Mr. Thomson read an invitation for the association to participate in the combined convention of the National Concrete Masonry Assn. and the American Concrete Contractors' Assn. which was held at the Sherman Hotel, Chicago, Ill., February 15 to 18, 1938, inclusive.

The sand-and-gravel and ready-mixed-concrete associations held a joint meeting on Thursday afternoon, which was devoted solely to a discussion of labor problems. It was an executive session and the discussion was "off the record".

Mr. Ahearn, the executive secretary of both associations opened the meeting with a paper on *Labor Developments in the Sand-and-Gravel and Ready-Mixed-Concrete Industries in 1937*. He recounted the events and decision of a year ago, when the association adopted a policy of interchanging labor information and contracts between its members and the association's staff. As a part of the program decided upon, a questionnaire was sent to all members for the purpose of adding to the staff's stock of knowledge on labor topics. Referring to the information derived from the questionnaires returned, Mr. Ahearn said in part:

"It is evident that union agreements have been more frequent in the past two years in our industries, but our business is still essentially an open-shop enterprise. As a matter of fact, despite the tremendous success of the C.I.O. and A.F. of L. in many fields, only 16 per cent. of the working men and women of the country are now affiliated with union organizations. Such contracts as have been signed in our industries have in nearly every case been under the auspices of craft unions composing the local building-trades councils of the American Federation of Labor. This is an important consideration in the light of actual and potential boycotts by such councils whenever in their judgment our employers, either deliberately or otherwise, have signed contracts with vertical unions, even though such vertical unions may be affiliated with the federation.

"The results of our survey also confirmed our repeated statements that the peak requirements of our industries justify a realistic program for maximum-hour control which will take into account our highly-seasonal characteristics in many parts of the country, the fluctuations in 'peak' loading requirements, and our susceptibility to adverse weather conditions. Generally the work program in our industries, in the absence of union agreements, calls for a weekly and not for a daily limitation, and both wage and hour agreements, formal and informal, have reflected the natural desire of our employees for securing the largest possible amount of hours of employment during 'peak'-load seasons".

The speaker described next some of the problems arising from boycotts.

"I believe it is fair to say that the overwhelming majority of union agreements now in existence in our industries have sprung from an external and not from an internal pressure. Since many of our companies market their materials in metropolitan centers, where the local building-trades councils dominate the sites of construction, we are peculiarly vulnerable to the boycott threat. The technique followed by the craft unions is the issuance of an ultimatum to our employers that unless they sign contracts with the craft unions, union forces on the jobs will refuse to handle the materials. It is only the exceptional instance, when these boycott threats are made after the business agents of the unions have organized our employees, for the union to confine its dealings to the employer.

"It is perfectly obvious that if an employer signs a union contract under these circumstances, he is guilty of a deliberate violation of the National Labor Relations Act or state laws patterned after the national law. He is interfering with the free choice of union affiliation by his employees, if he compels his men to join a union and if, in addition to that, he pays the initiation fees or membership dues of his employees in the respective unions.

"The employer is forced to take his choice between two unpleasant alternatives: (1) to comply with the spirit and letter of the Wagner act by refusing to deal with union representatives unless they actually represent his employees; or (2) to surrender to the ultimatum and require his employees, as a condition of future employment, to join a union which the employer has selected. Apparently some of our employers have been forced to take the last alternative on the basis that, law or no law, the craft unions were in a position to determine the business future of their company.

"When boycott threats were resisted by our employers, physical violence was resorted to in some cases and our men were intimidated. It is difficult to realize that such things could happen, but they did occur and we have to look that uninviting fact squarely in the face. Even where police protection could be secured, and sometimes it could not, our employer would find himself shut out of markets which were essential to the continuation of his operations, and he was exposed in some cases to threats of suits for violation of contracts for the delivery of materials. While one may say from Olympian heights that an employer should resist boycott threats under these circumstances and stick to the letter and spirit of the law, it should be remembered that things theoretically wrong are often practically correct. I do not want to leave this discussion by striking too pessimistic a note. I feel very strongly that public opinion in the long run will rise up against these boycott threats and the craft unions using them will find in the final analysis that they cause them more harm than good".

Mr. Ahearn then spoke briefly of the various provisions embodied in labor contracts signed during the year, saying:

"In too many cases our employers, once they have decided that a boycott can be successfully applied, have been disposed toward signing almost any kind of contract offered by the unions. Some contracts with which I am familiar contain provisions which are not justified by law or by morals. I have in mind one which seems to permit the unions to dictate the class of customers to which the employing company may ship, and the employer appears to have obligated himself to accept the instructions of the unions as to whether a given customer shall or shall not receive materials. Presumably if the union should call a prospective customer 'anti-union', no contract could be entered into between the employer and that customer, and the union would not be required to explain or to defend its commands. I believe we should resist with all the force at our disposal any attempt by the unions to take over the duties of management, and the provisions of the kind just described represent a complete surrender of elemental managerial obligations. . . .

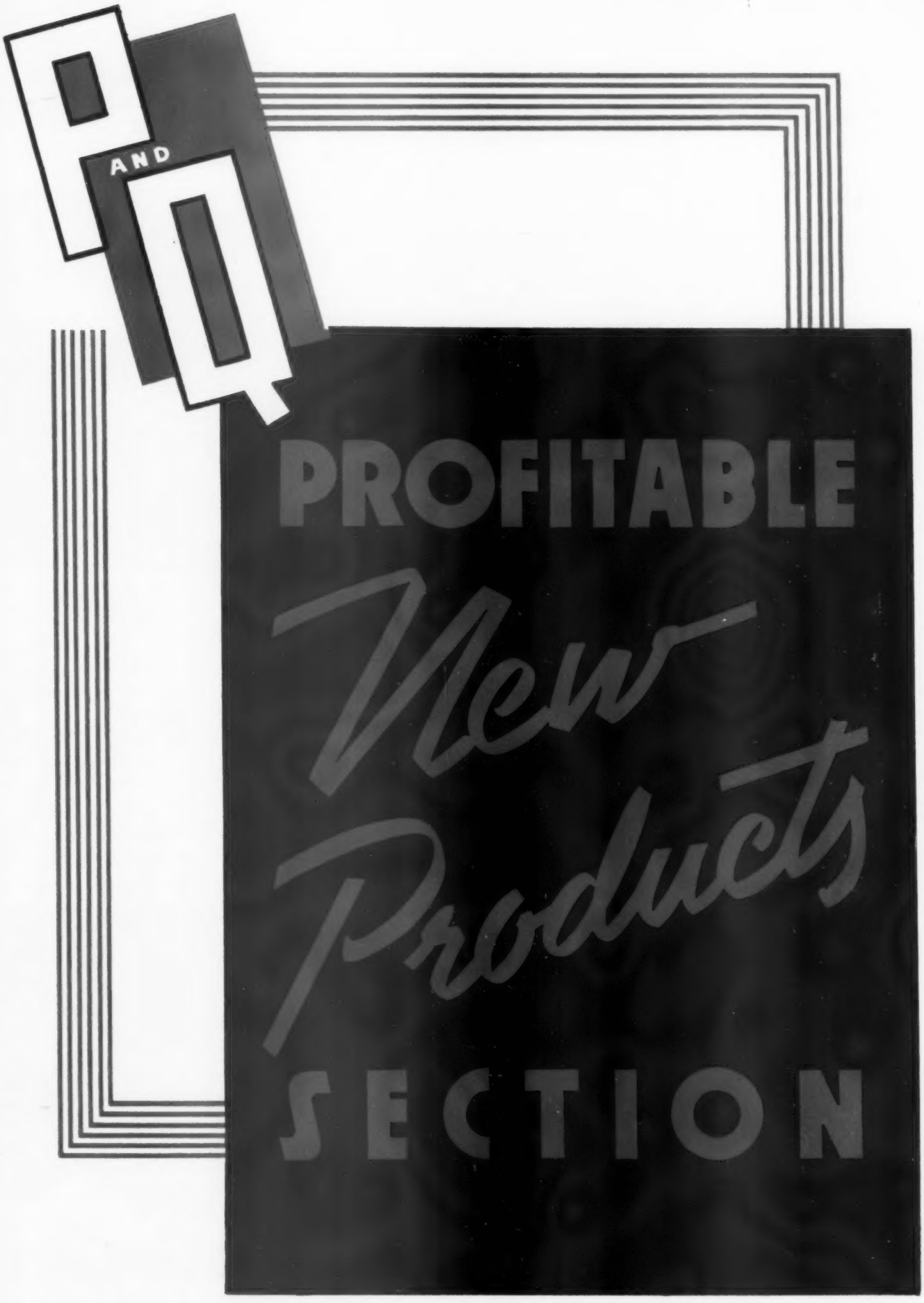
"There is no reason why our employers should blindly accept union agreements. Often an employer is told by the union representative that the contract handed to him is a standard contract which they require all employers to sign. These claims are frequently not supportable".

On the subject of Federal legislation affecting labor relations, the speaker said:

"I do not believe that Federal incorporation of unions is any real solution of the complaints of employers. It is good to keep in mind that if the Federal government can incorporate unions, it can also require the incorporation of business. Furthermore, we generally think of incorporation as limiting liability rather than enlarging responsibility. I think that some of the general acceptance of the theory of incorporation as the answer to all the questions is based upon sketchy information and upon a failure to think the matter through to its logical conclusion.

"In considering desirable modifications of the Wagner act, we recognize immediately that the meaning of some of its provisions must be clarified and not left to a high-handed board for interpretation. For instance, what does the term 'collective bargaining' mean? In the language of

(Continued on page 92)


P AND Q
PROFITABLE
New Products
SECTION

2,000 CONCRETE MEN ATTEND GATHERINGS IN

PROBLEMS confronting two important branches of the concrete construction industry were analyzed and discussed when more than 2,000 concrete contractors and concrete-products manufacturers from all parts of the country assembled for their annual conventions in Chicago, February 8 to 11.

Convening organizations included the American Concrete Contractors' Assn., National Concrete Masonry Assn., National Cinder Concrete Products Assn., and the Cast Stone Institute. It was the second time that concrete contractors and products men held their sessions jointly, the success of which was indicated by the 37-per cent. increase in registration over last year and a 33-per cent. increase in attendance.

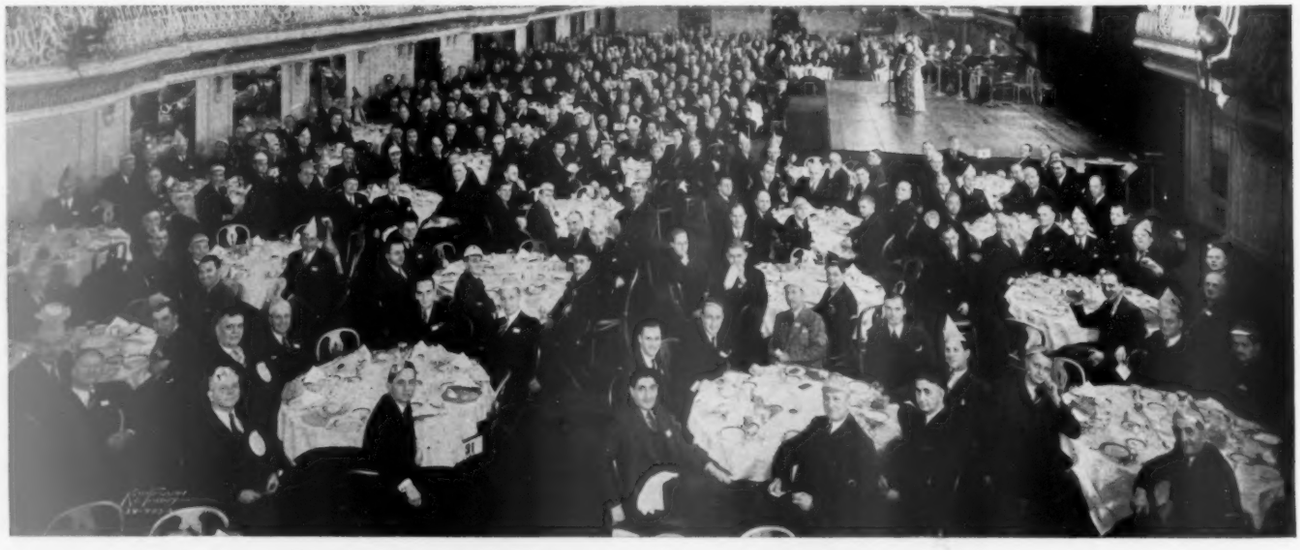
Held simultaneously with the conventions was the Concrete Industries Exposition, in which 50 exhibitors displayed almost every kind of concrete equipment and supplies from form ties and clamps to the latest types of mixer trucks, concrete-block machines, and concrete pumps. The success of last year's show brought a 50-per cent. increase in the number of exhibitions with the result that 46 per cent. more space was occupied. Exhibitors expressed more optimism regarding business prospects as a result of the 1938 exposition than they did in 1937.

One of the feature events of the week was the organizing of concrete contractors into an association known as the American Concrete Contractors' Assn. Bert Carey, concrete contractor of Forest Park, Ill., who served as chairman of the organizing committee, was elected president of the new body for 1938. Carl V. Carlson, of Minneapolis, Minn., was chosen vice-president, and Ralph C. Condo, of Somerville, N.J., secretary-treasurer. A board of directors was set up with Chas. J. Haase (Paris, Ill.), Frank Klepach (Cedar Rapids, Ia.), Phillip J. Hoerr (Peoria, Ill.), G. Winton Jones (Berkeley, Cal.), Fred Cappelletti (Waterbury, Conn.), O. K. Johnson (Waco, Tex.), and Emil Rohrer (Kansas City, Mo.) as members. Two more directors will be added to the board.

The purposes and aims of the new organization as set up by its constitution are: ". . . to build up an appreciation of and a demand for the services of the reputable concrete contractor as the means of assuring quality workmanship in concrete construction". By confining its membership only to those contractors who agree to live up to definite high standards of quality construction, and through the promulgation of these standards the association aims to gain respect and recognition in the building industry, and in this way influence better practices in concrete construction.

F. E. Milewski (W. E. Dunn Mfg. Co.), A. L. Rehnquist (Portland Cement Assn.), and A. R. Crow (A. R. Crow Co., Detroit, Mich.).

As the 1938 president of the National Concrete Masonry Assn., the products men in convention elected George H. Krier, Nailable Cinder Block Co., Brooklyn, N.Y. The vice-presidents elected were: John S. Chase, Chase Building Products, Inc., Fort Worth, Tex.; L. B. Weatherbee, John H. Black Co., Buffalo, N.Y.; and Roy McCandless, Cinder Block, Inc., De-



Several hundred were present at the annual banquet.

GS IN CHICAGO

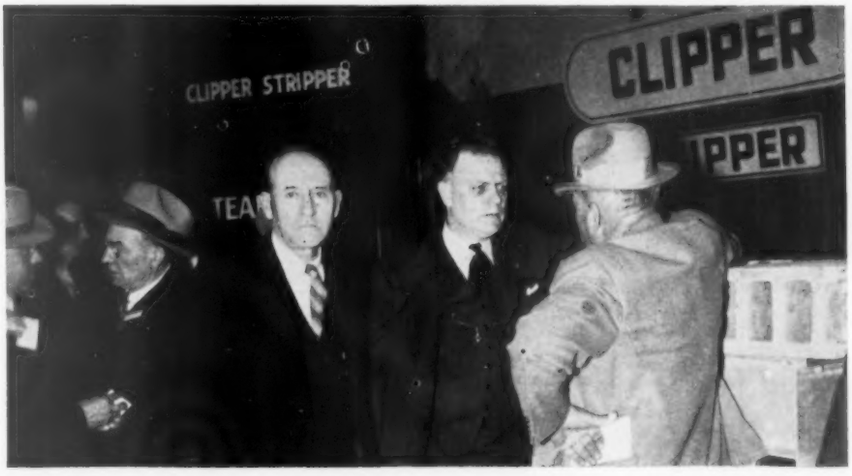
E. J. Heimer (Barrett Cravens Co.), Geo. F. Colton (Crumb-Colton Co.).

troit, Mich. Walter Sherman of the Milwaukee, Wis., Concrete Products Assn., was elected secretary-treasurer.

Dan F. Servey, Haydite Corp., Kansas City, Mo., who terminated his office as president at this session, was elected chairman of the board of directors. Elected to the board under Dan Servey were: Harve Kilmer (Iowa Concrete Crib & Silo Co., Des Moines, Ia.), John Strandberg, (Concrete Bldg. Units Co., Kansas City, Mo.), Roy Peck (Western Brick Co., Chicago, Ill.), M. W. Ferguson (Stone-Tile & Supply Co., Inc., Roanoke, Va.), and Harry Longenecker (National Bldg. Units Corp., Philadelphia, Pa.).

A highlight of the joint session held on the second day was the resolution drawn up by the combined groups endorsing the U.S. Housing Act of 1937 and the National Housing Act, the resolution, in part, reading as follows: ". . . Be it, therefore, resolved that our government's housing program as outlined in the United States Housing Act of 1937 and in the National Housing Act, through its stimulation of employment in the construction industry, is recognized and endorsed as a means by which America can achieve a high level of economic prosperity and stability". Copies of this resolution sent to the President Roosevelt, to the Administrator of the

H. C. Peters (T. L. Smith Co.), A. D. Aldrich (Nelson-Aldrich Constr. Co.), F. E. Bager (T. L. Smith Co.), R. F. Farrer.



F. G. Straub and Eugene F. Olson (Stearns Manufacturing Co.), R. B. Steele (Blue Valley Gravel & Sand Co., Fairbury, Neb.).

L. R. Wilson (Ransome Concrete Machy. Co.), C. E. McLain (Western Contractors Supply Co.), J. McElwee (McElwee & Rogy, Peoria, Ill.), W. Muller and J. C. Schniedwind (Ransome Concrete Machinery Co.).

S. R. Edmonds (Edmonds Art Stone Co., Inc., Washington D. C.), F. H. Hedinger and J. F. Loff (Multi-Vent Brick & Constructions, Ltd.).

Robert W. Baker (O. T. Christierson Co.), E. J. Goes (Koehring Co.), O. T. Christierson (O. T. Christierson Co.).

Ed. McCrady, Jr. (McCrady-Rodgers Co., Pittsburgh, Pa.), H. L. Grosvenor (R. & L. Concrete Machinery Co.), W. H. West (R. & L. Concrete Machinery Co.), R. B. Steele (Blue Valley Gravel & Sand Co., Fairbury, Neb.).

U.S. Housing Authority, and to the Administrator of the Federal Housing Administration drew a telegraphed reply from Stewart McDonald, head of the Federal Housing Administration. His answer: "Your telegram containing resolutions adopted yesterday is most heartening. The machinery is here for the government to do its part in stimulating home construction. Our success in the long run, however, depends largely upon the whole-hearted voluntary coöperation of such organizations as yours".

In discussing the progress and future prospects for concretors, W. D. Allan, director of promotion of the Portland Cement Assn., stated at the joint session that "Men in the concrete industry have greater confidence in its future than ever before".

Dan F. Servey, president, of Kansas City, Mo., presided at the opening session Tuesday. Mr. Servey outlined the favorable position of the industry in advancing the use of its products in both commercial and residential work. He mentioned especially the gains made in the construction of firesafe concrete houses during the past two years, as evidenced by an increase of 63 per cent. in the volume of concrete building units used in the housing field as compared with 1936. This is a remarkable showing when it is considered that residential building of all types increased only 20 per cent. in the same period.

E. W. Dienhart, assistant manager, Cement Products Bureau, Portland Cement Assn., who is also assistant secretary of the National Concrete Masonry Assn., discussed ways and means of better adapting concrete products to the housing field. He pointed out that there is a ready market and an established demand on the part of the public for houses that are firesafe, structurally sound and safe from termites, tornadoes and other hazards. He also pointed out that it was now possible to build at low cost a house so that the owner could have the benefit of these desirable features and at the same time obtain any architectural design or exterior effect which he might prefer.

Albert E. Bill, a large builder from Detroit, presented the subject *The Firesafe Concrete Home as a Profitable Enterprise for the Operative Builder*. Mr. Bill said, "Concrete house construction is just beginning to come into its own and as we progress and become more efficient in manufacture and fabrication, the price level will drop below that of other similar types of construction and even below wood construction. I find very little, if any, difference, and in some cases concrete is less expensive. If two builders are

H. W. Butler (Butler Bin Co.), Geo. C. Bowyer (Union Concrete Pipe Co., Huntington, W. Va.).

offering the same type of house at the same price and one has a concrete floor and the other an ordinary wood floor, there would be no doubt as to who would sell his property first, and concrete floors are only one of the important items of concrete construction which have increased sales appeal".

The prefabricated concrete house was also discussed in detail by Quentin Twachtman, president, Connecticut Precast Building Corp., Irvington, N.Y. Mr. Twachtman outlined the experiences of his company in constructing factory-made precast panels of large size which are delivered to the site by trucks. The panels are then erected with a crane and the walls and floors of the complete house can be finished within two or three days' time.

Eugene B. White, Chicago architect, told of an interesting new development in the methods used for building concrete floors at lower cost. Mr. White said that his ideas in this direction were crystallized as a result of his work as supervising architect for the Victor F. Lawson Y.M.C.A. building erected some years ago in Chicago.

As a result of his observations on this and other projects he came to the conclusion that considerable economies could be effected if a reduction in the weight of the concrete could be obtained and at the same time simplify construction procedure. As a result, he has developed a method employing a steel form and a precast-concrete slab construction which simplifies erection and gives a floor of considerably less weight than ordinary floors. Mr. White said that precast-concrete slabs were now being manufactured in the Chicago plant of the Masey Concrete Products Co. for this type of floor and the first use of this type of floor construction was made in a number of Chicago buildings.

Miss A. Groble, Ciro Paolella (Hamden Building Tile Co., Inc., Hamden, Conn.), A. De Giovanni and W. L. Hooker (Glaze-Crete Corp.).

Paul Moran (Federal Housing Administration), Howard S. Sayre (Fuller Co.).

In describing the White-Steel monolithic method of precast-slab construction Mr. White said:

"I could start out by going over the drawings of the White-Steel methods and into the technical points of its design, but I believe it would be more interesting to you if I first tell you how the idea originated and what its accomplishments are.

"It starts, first, as an engineering problem—a discontent with some old inefficiencies in design and construction of buildings. I am sure that many other designers have experienced this same discontent with the excessive and cumbersome dead loads involved in past methods of construction. Some dead loads, of course, will always be present in the materials we use, but useless dead load is a challenge to the engineer who is radical enough to want to do something about it. It might be well, at this point, to say that the White-Steel system is designed for and being used in small buildings as well as large ones; in fact, our first job was for a one-story park recreation building and we have installed it in a number of single-family dwellings. The larger the building, however, the greater is the efficiency and the economy gained.

Wood Sanford, R. D. Houghton, A. W. Jeske and Anthony Graff at the Chain Belt Co. exhibit.

L. G. Conroe (Blystone Mfg. Co.), W. F. Ochs (Ziegler Mchy., Inc.).

"The fabrication and use of steel in buildings was the first and perhaps the

R. E. Cowan (United Cement Products Co., Wichita, Kan.), S. C. Hirst (Purcellville, Va.), Stephen Flam.

Left to Right: J. J. Staley, Dave Lewis, Fred Wehrum, Haakon Paulson, L. E. Edlin (Besser Mfg. Co.)

Leonard J. Keilman and Frank H. Keilman, (Keilman Bros.), and Frank Muenzer (Multiplex Concrete Machinery Co.).

greatest step towards both strength and lightness in construction. Unfortunately steel is not fire-proof; that is, the heat of conflagration causes it to warp, twist, and fail unless it is protected with a fire-proof covering. Here is where concrete is useful, for it is highly fire-resistant and has considerable compressive strength. It is by the union of these two materials that the best results are obtained.

"Let us consider for a moment the weights involved in other types of fire-proof construction. The conventional reinforced-concrete slab floor poured monolithically 8-in. thick, for a span of 18 ft., designed for a 125-lb. live load weighs 100 lb. per sq. ft. One-way ribbed-floor construction placed monolithically with burned-clay-tile fillers for the above span weighs 60 lb. per sq. ft. A conventional reinforced-concrete T-beam construction for the same live load design weighs 43 lb. per sq. ft.

"Of the conventional fire-proof systems, these are the three principal ones. You will thus see that of all the designs available in fire-proof construction the T-beam design has the lightest weight and greatest strength per pound of dead load. However, the conventional T-beam concrete floor, as do all former concrete designs, involves expensive form work and the subsequent delays incurred.

"At this point, let me take you back several years to the time the Lawson Memorial Y.M.C.A. was being designed. It was at this time that I was brought to Chicago and placed in charge of this work. Frank Randall was engaged as structural engineer on this work, and, in order to save dead loads in this building we urged the use of light-weight concrete.

"This was found to be feasible and the building was designed using a T-beam system poured monolithically of light-weight concrete. The building stands to-day as one of the first large buildings in the world with structural floors of light-weight concrete and the steel framework fire-proofed with light-weight concrete.

"There was, of course, no flaw in Mr. Randall's engineering on this building and it is structurally sound in every particular, as those who are housed in it will testify. The lighter dead loads resulting from the light-weight concrete resulted in substantial savings on both the structural steel and foundations. Some difficulty, however, was experienced in controlling the uniform quality and strength of the concrete poured on the job and in order to overcome excessive deflections in the concrete design additional tension steel reinforcing was used.

C. O. Dunn (Blaw-Knox Co.), below, B. A. Rieth (Universal-Atlas Cement Co.), R. P. McKendrich (Blaw-Knox Co.), C. Carlsen (Superior Ready-Mixed Conc. Co.) above.

"An inspector for an engineer's laboratory was kept continually on the job consistently testing the uniformity of the concrete. This caused some delay and considerable expense.

"For a considerable time following the completion of this building my mind was at work on a more efficient system of floor construction which would eliminate these drawbacks as well as facilitate and speed up construction. I finally hit upon the idea which has been worked out in the White-Steel monolithic system.

"By this method form work is eliminated and the dead load in the floor construction reduced to 33 lb. per sq. ft. for a live-load design of 125 lb. with a span of 18 ft. No departures whatever are made from accepted engineering formulas in the design of the White-Steel system.

"In place of concrete entirely poured on the job, the light-weight floor slabs are precast in a modern concrete plant with every facility for controlling the uniform quality and strength of the concrete. These slabs are 5 ft. 9 in. long, 15 in. wide and 2 in. thick. Welded-steel reinforcing mesh runs through each slab and projects from the ends serving as stirrups when bent down into the hollow steel sections. Each precast slab is continuous across one steel section and extends to the section on either side making the reinforcing of slabs and beams continuous. Tension bars are placed in the hollow steel form sections to provide tension reinforcing similar to any reinforced concrete beam or joist, and the hollow sections are filled with concrete on the job. A large dowel hole is provided in the center of each slab and through this hole a steel dowel-stirrup is placed projecting into the beam beneath. The side edges of the slabs are so mortised that a V-shaped groove is left between slabs. This V-shaped space partially fills up when the concrete joists are poured and the balance is filled with grout insuring a positive equal transfer of stress from slab to slab. The only structural concrete placed on the job in the floor or roof construction is that required for filling the hollow steel forms.

"The hollow steel sections are made of light-weight cold-formed steel and are quickly and easily placed on 3 ft. centers resting on girders or bearing walls. They have a surprising degree of strength even before the concrete has been poured into them and provide an immediate working deck as soon as the slabs are laid across them. Not only form work but considerable scaffolding is thus eliminated. The masonry wall construction can be erected from this working deck resulting in great convenience and time saving.

"In the White-Steel method over 72 per cent. of the concrete in the floor- or roof-deck systems is precast in the slabs, leaving but a small per cent. of the concrete to be poured on the job through the convenient openings left between the slab-ends."

Benjamin Wilk of the Standard Building Products Co., Detroit, Mich., spoke on his company's experiences with the electric curing of concrete units.

"Our experiences with the electrical curing of concrete blocks show that they can be cured satisfactorily by this method," he declared. "The principal advantages of this type of curing are (1) speed in curing, and (2) uniformity of strength.

"As a result of speed in curing, blocks can be piled in the yard, if necessary, at the end of 6 hours curing during mild weather. In very cold weather, a longer period of time is required.

"Uniformity in strength is due to the fact that the electrical current passes through each block almost in equal amounts. The position of the block on the rack or in the kiln is not important. The amount of moisture in the black regulates the amount of current and, therefore, the amount of heat that the black obtains.

"The cost of curing electrically depends on weather conditions and the local cost of power. Generally, the cost of curing under average conditions will be about ½ c. per unit.

"Curing racks and necessary power equipment have been developed which will give dependable results. The cost of this equipment will compare favorably with costs for other methods of curing."

Lion Gardiner (Jaeger Machine Co.), A. M. Davis (Illinois Minerals Co., Cairo, Ill.), J. A. Thomas (Jaeger Machine Co.).

Irving Warner Again Chosen to Head Lime-Putty Products Assn.

SEVENTY persons interested in lime-putty manufacture attended the second annual meeting of the Lime-Putty Products Assn. at the Netherland Plaza Hotel, Cincinnati, on February 1. The members present re-elected to the presidency Irving L. Warner, vice-president, Warner Co., Philadelphia. As vice-presidents they chose E. S. Simpson, president, Super Concrete Corp., Washington, D. C., and Herbert Jahncke, Jahncke Service, Inc., New Orleans. W. Hayden Brooks, Brooks-Taylor Co., Birmingham, Ala., was elected secretary.

Some helpful hints in advertising and selling lime putty were presented in a paper, *Keep Selling; Don't Coast*, by Milo E. Smith, advertising manager, Chicago Bridge & Iron Works, manufacturer of Brooks-Taylor lime-putty plants. Among the opportunities for advancing the use of lime putty he enumerated the following.

"(1) When spring opens up, send a letter calling attention to building opening up.

"(2) When you put a price increase into effect, capitalize on otherwise adverse news by announcing it in advance and explaining why it must be done. By the time it goes

into effect, the resistance to it will have worn off.

"(3) To celebrate good business tell your prospects who are using putty and what they think of it.

"(4) To mobilize against bad business call a council of war and urge all your customers to get together and fight their way out of slow business.

"(5) At the holiday season send your customers a friendly letter.

"(6) When frost threatens give your prospects a warning about the dangers of jobs freezing. Tell them how to prevent danger.

"(7) When your sales-manager is invited to talk to the Chamber of Commerce, invite your prospects to hear him.

"(8) Have open house. Invite architects and contractors to visit your plant. Make it a point to do this regularly, once a month or so.

"(9) Get your newspaper to write up some of your jobs; then reproduce the story and send it to your prospects.

"(10) Distribute a calendar. Use a three-months' calendar or a monthly blotter, so you can mail it to your customers oftener than once a year.

"(11) Have sales competitions. There are hundreds of them. Give your representatives prizes for the most calls on new customers, the most new customers on the books, the largest increase in sales, etc.

"(12) Print a message on the bottom of your invoices about lime putty or include a stuffer in the envelope."

John C. Best, president, Best Brothers' Keene's Cement Co., described the use of Keene's cement for gaging lime putty in making plaster to shorten the setting period.

According to the speaker, the disadvantages of lime putty gaged with Keene's cement are:

(1) It is impossible to double up plaster with lime the same as can be done with gypsum.

(2) Lime plaster will burn the plasterers if handled incorrectly, but this can be easily avoided.

(3) The depression brought on a familiarity with gypsum plasters on the part of younger plasterers.

(4) Lime plaster is not recommended for use on gypsum lath. It has more moisture and due to its slower setting qualities soaks up the fiber coating on the gypsum lath.

There are six different types of lath and lime plaster can be used to advantage on three of them, at no disadvantage on two more, and at a direct disadvantage on only one type, namely, gypsum lath.

(1) The three types of lath where lime plaster can be used to advantage are: (a) wood, where it allows hardening without cracking; (b) metal, where the lime serves as a preservative; and (c) concrete, where it provides a good bond. There is no better bonding material than lime putty to concrete.

(2) Tests show that lime mortar is a better sound-proofing material than other mortars.

(3) It is difficult to prove the acoustical value of plasters and it is impossible to show any difference between lime mortar and other mortars.

Mr. Best went on to say that the success or failure of the operation of a lime-putty plant depends on certain tangibles and other intangibles. They are:

"(1) You must keep putty in a stiff form. When agitated violently, as with pumps, the putty is spoiled.

"(2) Guard against droppings.

"(3) You must have good workmanship on lime-putty plaster. It must be a three-coat job.

"(4) You must believe in your product. Do not sell it at a lower price than competitive mortar."

Mr. Best explained the most successful method of producing lime putty plaster as requiring the following procedures:

"(1) When mixing the putty at the plant put in the putty first, Keene's cement next, then the sand, fiber and water.

"(2) When mixing in transit trucks, put the lime in last, determine the mixing period accurately, and guard against over mixing."

Lee S. Trainor, chief engineer, National Lime Assn., spoke on *The Proper Use of Lime Putty*. He stated that experiments are being made in which putty, cement and water are added and mixed together and sand added later in producing mortar. This procedure is being followed to obtain pre-hydrated cement. It dissipates the heat of hydration.

Mr. Trainor stated that the different rate of absorption of bricks introduces problems in building, but that any brick can be used successfully with lime-putty mortar. The solution is matching to each type of brick a mortar which will live with it.

Mr. Trainor stated that lime is added to mortar because it produces workability, resists the loss of water under suction, and it reduces volume change in the hardened mortar.

Portland cement is added to lime putty sanded brick mortar because it increases the rate of hardening during the earlier hours, and it increases the strength of the mortar. A strong mortar does not necessarily make a strong brick wall. The important thing is to get a mortar that will give a high-strength wall when completed.

Mr. Trainor stated that men operating putty plants have a real opportunity and a challenge to prevent leaky walls. He made the following comments regarding cold-weather operation.

"Warm all materials. House-in the building, if conditions are severe, or wait until favorable weather. Anti-freezes only reduce the freezing temperature a few degrees and have disadvantages. Often they cause the surface to scale off and may even cause damage beneath the surface. The only successful method is to keep the mortar from freezing until it is hardened."

In regard to efflorescence, Mr. Trainor stated that "if you do not fill the joints you get efflorescence, but if you do a good job with lime mortar you will not. The character and quality of the mortar may influence the quality of the workmanship, but the workmanship is the main thing."

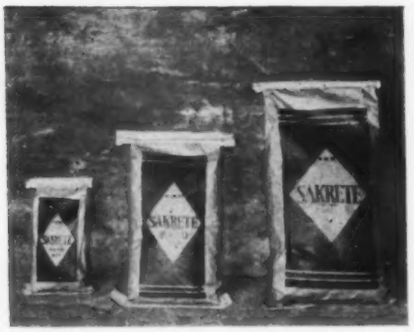
Alexander Foster, Jr., explained that lime putty enables an operator to furnish customers with a superior product in a convenient manner. The customary procedure is to supply an over-sanded mortar, adding cement on the job. This method has worked successfully. He explained some of his early experiences which were that lime handled in pumps whipped up so that the lime held too much moisture. He stated, however, that this difficulty is overcome by the present method of handling lime by gravity in lime-putty plants.

Mr. Foster described tests which have been made with hydrated lime to take the place of some of the cement in making concrete. He stated that these mixtures show greater strength, higher flowability, less honeycombing and an increase in densification.

With the old Blue Diamond putty the proper consistency was considered to be that of whipping cream and a 5 per cent. admixture of putty in the concrete. The reasons for this are that it overcomes brittleness in the concrete, it limits honeycombing, it lessens volume changes; it obtains flowability and avoids stratification; and it minimizes the amount of free water.

W. Hayden Brooks described some of his experiences in supplying plaster. The mixture used was 1 cu. yd. of sand, 9 cu. ft. of putty and 300 lb. of Keene's cement to the cu. yd. for the scratch coat. For the fact coat the mixture was 1 cu. yd. of sand, 7 cu. ft. of putty and 200 lb. of Keene's cement.

Pioneer Ready-Mix Producer Creates New Industry with Dry-Mixed Concrete in Bags



The 11-, 45-, and 90-lb. bags in which this product is packed. BELOW: A. C. Avril and his plant foreman at the office door.

SOME years ago Arthur C. Avril, then a ready-mixed concrete producer in Cincinnati, noticed that there were many calls for concrete in small quantities ranging from a bucketful to ½-cu. yd. Because of the high cost of filling such orders with the available equipment, they were usually rejected and the would-be buyers were advised to purchase loose sand, gravel and cement and mix their own concrete. Most of these individuals, however, insisted that they wanted a proportioned mixture which could be depended on to make good concrete. This insistence eventually resulted in a new industry, as Mr. Avril soon began investigating the possibility of mixing dry aggregates and cement and packing them in bags. After much experimentation he found that, if a certain procedure was followed, it was possible to market a packaged concrete mixture which could safely be kept in storage for several months.

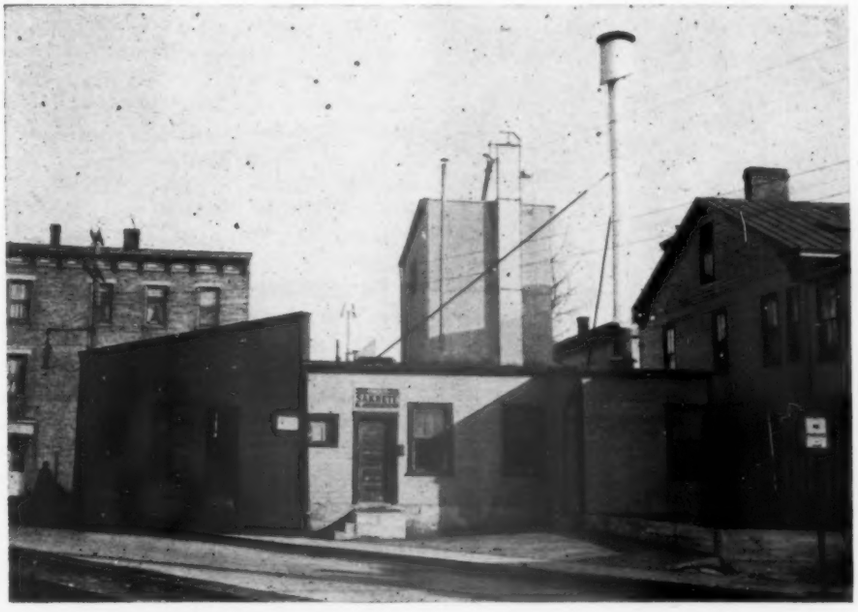
After developing and patenting a process Mr. Avril investigated the potential demand. By checking the amount of loose aggregates purchased in small quantities and the small-lot ready-mixed-concrete demand he concluded that there was a potential annual market after the product became known of about 80 lb. per capita. This figure was divided by five in order to be conservative and the resulting total annual demand figure for the Cincinnati area was used in determining the capacity of his company's plant and the retail price to be asked for its product.

Contents of sack taken from storage illustrate lack of segregation.

This plant is owned and operated by Sakrete, Inc., and is located at Apple St. and the B. & O. Rwy., about 5 mi. from downtown Cincinnati. It went into operation late in 1936 and the market has already been developed to a point where the demand is approaching the original estimate of potential demand. The peak was reached in August, 1937 when about 600,000 lb. was sold. This capacity was obtained with a crew of only two men who took care of all operations including shipping. Some sand mixture has also been sold to be used as mortar for grouting, topping, etc. These products are sold in 11-, 45- and 90-lb. bags.

The aggregates are received in trucks and are dumped into a 3-compartment steel-lined concrete hopper. A belt-conveyor operating in a tunnel feeds one material at a time from this hopper to a bucket-elevator which raises it to a rotary drier having a capacity of 8 tons per hr. This drier is of the direct-indirect type and is gas-fired. The use of gas as fuel makes possible intermittent operation of the drier with the maximum fuel economy. Temperatures average 600 deg. F. at the discharge end of the drier and 185 deg. F. in the steel stack, which has a baffled hood and sprays to settle the dust.

The dried aggregates are discharged into a bucket-elevator feeding individual bins which supply special equipment to prepare these materials for



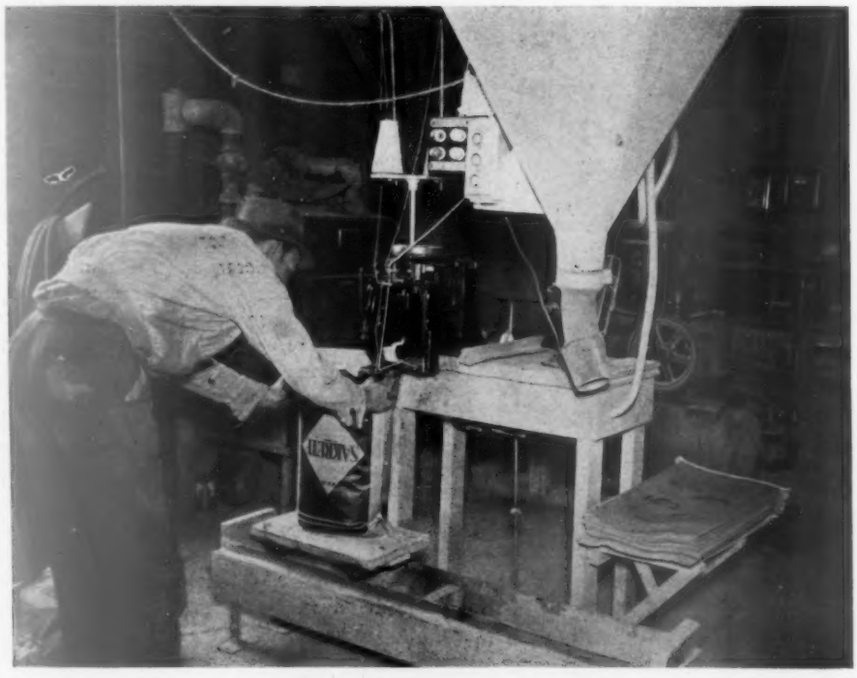
The plant of Sakrete, Inc., with aggregate hoppers in right foreground. In the center are the aggregate elevator and bins and the drier stack.

The rotary drier with stack in background. In the foreground is the aggregate and cement elevator.

sacking. Cement is dumped from sacks into the same elevator. The cement and aggregates are automatically batched and loaded through a spout into sacks. A system of signal lights shows when all the functions are being performed.

The paper bags used are already sewed at the bottom when received and after loading are sewed shut at the top by a bag-sewer. The use of 4-wall paper bags somewhat heavier than those commonly used for cement insures against sack-breakage in handling and protects the contents from moisture. In this plant natural sand and gravel of ¾-in. maximum size are being used, but crushed stone can be used if preferred. The shape of the aggregate particles, according to Mr. Avril, makes no difference, as the fines cushion the sharp edges of the large stones and protect the bags.

As president of the Avril Tru-batch Concrete Co., Mr. Avril is said to have been the first operator of a ready-mixed-concrete plant between St. Louis and Pittsburgh. He was also one of the first to use agitator trucks to deliver plant-mixed concrete, and designed such an agitator for his own use. His company was also one of the first to sell concrete on a strength basis and supplied many large construction jobs, among them the Cincinnati Union Terminal. He was active in the formation of the National Ready-Mixed Concrete Assn. and served several years as secretary of that body.



One of the filled sacks being sewed shut. At right is the spout through which batched mixtures are loaded into sacks.

Mr. Avril's experiences in developing this market are interesting. Newspaper advertising was first used, but was found to be too expensive for the amount of coverage obtained. Now reliance is placed mainly on direct-by-mail advertising directed to names compiled from lists of coal dealers, home owners, etc. Pamphlets are distributed by building-material dealers, who are also supplied with metal signs to be hung on their warehouses. All sales are made through dealers except, of course, in the cases of such large buyers as the government, public utilities, etc.

The largest market for this product is among home owners who want to do odd jobs on their properties. Contractors using ready-mixed concrete on a job also use this product to finish up a pour where less than a full load is required, saving both material and labor costs. Plumbers and heating contractors use this material in their work and many sales are made to apartment and office buildings for minor repair work. The Carew Tower, a 48-story office building for example, in 1937 used 800 90-lb. bags of Sakrete for ordinary alterations, machinery foundations, etc. An outdoor advertising company purchases this material in large quantities for use in the erection of signs in almost every state east of the Mississippi River.

The mixture produced in this plant is designed to give over 4,000-lb. strength in 28 days, provided that not more than a specified amount of water is used. This safety factor insures a good workable concrete even in inexperienced hands. The automatic mixing and batching methods used make is possible to proportion, mix and pack the contents of each sack separately and economically. This procedure insures a uniform product and eliminates segregation.

It is Mr. Avril's intention to make this product available in all sections of the country and he is prepared to furnish a completely-engineered plant ready to set up. He will also train the personnel, help establish a market, and furnish the trademark. These plants are to be limited in number and location by the potential demand in order to prevent the overlapping of markets. The product of the Cincinnati plant has been shipped in carload lots as far as 250 mi., but a 100-mi. radius is considered a logical marketing area.

ABOVE—A view of the Concrete Pipe Co. plant at Seattle, one of the joint-users of the brick-making machine.

ABOVE — The brick machine in operation. LEFT — Plant and storage yard of the Harrison Pipe Co. in Tacoma.

CURING STEAM GENERATED ELECTRICALLY AT TACOMA CONCRETE-PRODUCTS PLANT

By W. E. TRAUFFER

THE concrete-products industry in the Pacific Northwest has for many years devoted most of its efforts to the manufacture of concrete pipes and tiles. These are used mainly for the irrigation of farm land, highway drainage, etc. Concrete bricks and blocks have been made in small quantities, mostly by hand, but have remained a minor by-product of the industry. In this vast lumber-producing region wood has always been the favored building material and has been used wherever possible. In the face of this competition a group of concrete-pipe manufacturers in the Puget Sound area early in March, 1937 embarked on a joint campaign to develop a market for concrete bricks. These producers jointly purchased a Dunbrik machine, which is moved around from plant to plant by trucks as needed.

The seven companies sharing in this arrangement are located in Puyallup, Seattle, Olympia, Aberdeen, Bremerton, Shelton and Tacoma, Wash. These cities almost completely encircle Puget Sound, yet none of the marketing areas of these companies overlap, making this an ideal arrangement. All these companies are members of the Concrete Pipe Manufacturers' Assn., which has 15 member companies in western Washington.

One of the companies participating in this venture is the Harrison Pipe Co. of Tacoma, Wash. This company is known to the industry as a pioneer in the use of electricity in its operations. The original plant was built in 1927 and in 1929 a novel method of electrically generating steam for its kilns was adopted. This method received considerable publicity at that time and has since been adopted with minor variations by other producers. In November, 1935 the plant burned to the ground. The equipment was salvaged and incorporated in the new plant which was built almost as soon as the ashes of the old plant were cool.

The plant is located on property leased from the Harrison Bros. Co., and aggregates are supplied from a sand-and-gravel plant operated by that company. The aggregates are delivered by trucks and are dumped directly into the products-plant bins. These aggregates are transferred in wheelbarrows to the 14-cu. ft. blade-mixer which discharges them by gravity into the hoppers of the two pipe machines. There is a third hopper which feeds the Dunbrik machine, when this is in place under it.

The pipes are transferred to four 12-ft. by 50-ft. kilns, where they are kept for two days or more depending on the outside temperature. Curing is aided by both steam and water sprays. The steam is generated in two electrically-heated copper water tanks each of

which serves two kilns. Each tank is 27 in. deep, 5 in. wide and 6 ft. long and has a capacity of 25 gal. In the bottom of each tank are two 5-kw. heating elements of the type used in water heaters. These elements are inclosed in copper tubes and can be removed through the ends of these tubes. The current used is sufficient to boil the water and produce the ideal saturated live steam at zero pressure.

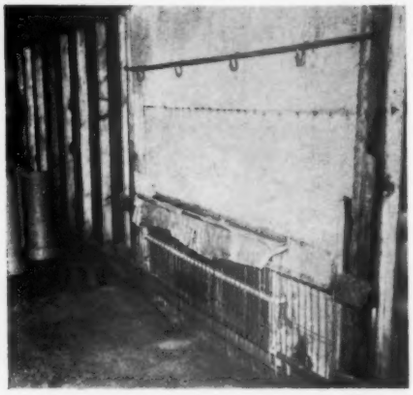
The bottom and ends of each tank are encased in concrete. The sides are open to the air, but wire-mesh guards

Blade mixers which prepare the concrete. Measuring larry above.

protect the workers against burns. The water level in each tank is maintained by an automatic feed from an outdoor supply tank. In the case of a failure of the water supply a float switch in each tank automatically breaks the electrical circuit when the water level drops below a given point. Each tank is in the wall between two of the kilns and can supply steam for either one or both as desired.

The actual cost of operation of this steaming system is very low, according to E. L. Warner, secretary and general manager of the company. The plant power cost is quite high due to the comparatively large connected power load of which very little is used at any one time. For this reason the use of electricity for generating steam overnight when the plant machinery is shut down adds little to the power cost. The current for the machinery and that for heating are on the opposite sides of a double-throw switch, so both can not be used at one time. When steam is needed for rush orders during the daytime when the plant is operating, this is generated by a small wood-fired boiler.

The cured pipes are carried to outdoor storage by pneumatic-tired hand carts and trucks. The company has five acres of storage space which is above the level of the street. Driveways cut back from the street make it possible to load pipes on trucks direct from the ground level without lifting them. Large pipes are rolled on the trucks.



One of the electrically-heated pans producing steam for the curing kilns.

In addition to sewer and culvert pipes the company also makes concrete posts, meter boxes, well curbing, septic tanks, etc. There has also been a considerable demand for 12-in. perforated pipe by the state highway department. This pipe is laid on the sides of highway cuts to dry them out and prevent slides. The perforations, which are made by hand while the pipe is still green, are laid downward to prevent clogging.

The Concrete Pipe Co. of Seattle, Wash., was using the Dunbrik machine at the time of the writer's visit to this territory. This company is one of the largest producers of concrete products on the Pacific Coast and has been in this business for 20 years. In addition to concrete pipe, blocks, and small specialties this company makes vibrated piling, track slabs, floor joists, etc. Pipes up to 60 in. in diameter are made regularly and larger pipes can be made to order.

The sand and gravel are received in trucks and are dumped into a hopper

Making pipe by the tamp method.

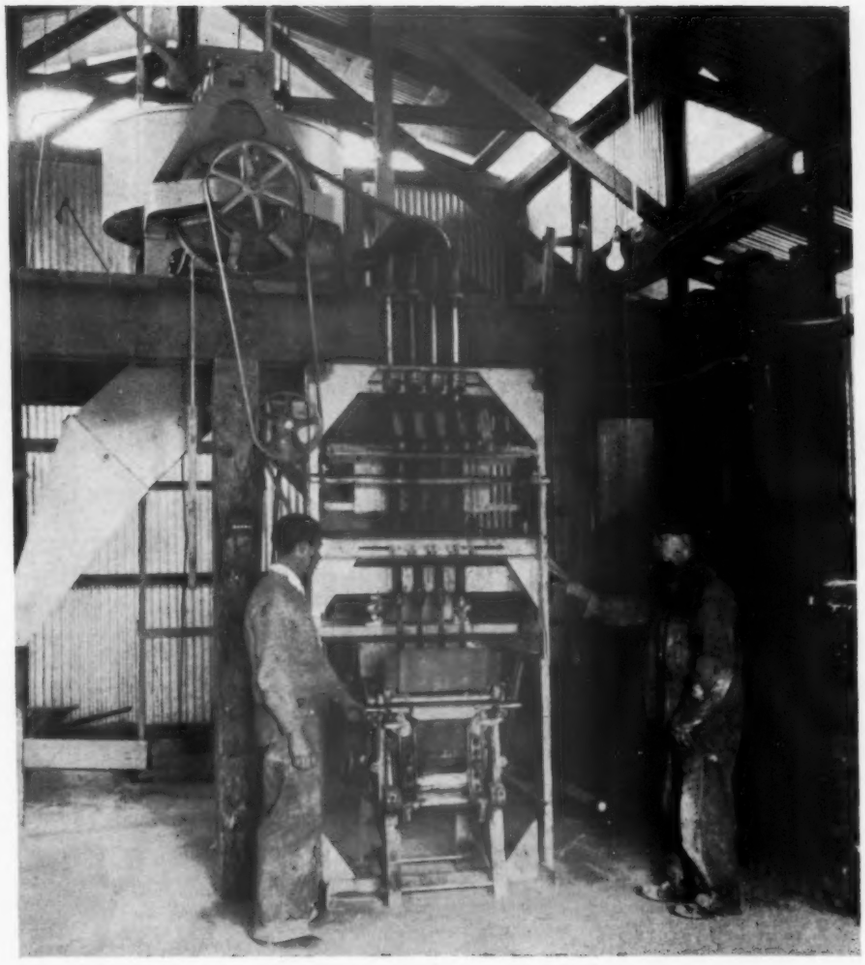
Making 60-in. bell-and-spigot pipe. Note vibrator on form at left.

from which a bucket-elevator raises them to the overhead storage bins. The aggregates are measured in a bucket which is suspended from a monorail and supplies aggregates to three Blystone blade mixers. One mixer supplies concrete for a machine for making 4-in. to 30-in. pipe. Another mixer supplies a Tuerck-Mackenzie machine for making small pipes and a Dunn automatic tile machine. The third mixer supplies an Anchor tamper block machine, a hand brick machine and the new Dunbrik machine.

Aggregates for large pipes are discharged from the bins into a weigh

Pipe being sprayed in one of the kilns of the Harrison Pipe Co.

hopper equipped with a Fairbanks dial scale. Cement is added from sacks and the materials are discharged into a drum-type mixer. A skip bucket discharges the concrete into the pipe forms. The pipes are made in forms of the company's own design, and are shaken by an electric-motor-driven off-center vibrator securely fastened by chains to the forms. Each of the 60-in. pipes shown in one of the accompanying illustrations is 6 ft. long and requires 2⅓-cu. yd. of concrete. The curing is done in steam kilns



LEFT: The block machine with mixer above and skip in background. At left is spout for specials. ABOVE: Exhibit of products in various colors in plant office.

Precision-Made Concrete Units Prove Popular in Tucson, Ariz.

"CONCRETE versus brick" might be a suitable name for a battle now being waged in Tucson, Ariz. The Concrete Products Co., of that city in September 1, 1937 put into operation a modern concrete block and brick plant, the first in that rapidly-growing city. Up to that time only hand-made blocks had given any competition to the adobe and clay bricks which have for many years been the favored materials for home construction in the states along the Mexican border. Dr. C. J. Wilkerson, a physician with no previous experience along this line, is the owner of this plant, but he leaves the management of the business to A. Knapp, an experienced block man. Most of the blocks and bricks produced are used in home construction and the potential market is evident from the fact that Tucson, a city of about 60,000, more than doubled its population in the past ten years and is still growing.

This plant is located about 3-mi. north of downtown Tucson, on the south bank of the Rellita River, which belies its name except during the short winter rainy season. The sand and gravel used in making the blocks are obtained from the river bed. These materials are only hand-screened at present, but a small washing and screening plant is soon to be installed. These materials are dumped from trucks into a corner of the block plant.

The aggregates are shoveled by hand into the 10-cu. ft. skip bucket of the Concrete Equipment Co. Model L 37 block machine. Cement is added from sacks. These materials are discharged from the bucket into the 10-cu. ft. mixer, which, known as the shovel type, consists of a vertical cylinder with vertical paddles attached to a central drive shaft. The bottom of the mixer is a flat cone, and after mixing is completed these paddles also feed the mixture toward the center discharge opening. The conical plug in this opening is raised by a lever from the floor below.

The concrete is discharged into a divided chute. A lever-controlled gate feeds through one side of the chute to a small hopper from which the concrete is discharged into the mold by a belt-feeder. This machine can make 100 8-in. by 8-in. by 16-in. blocks per hr. A brick mold, which makes 10 standard bricks at one time, can be substituted. Over 500 blocks have been made in an 8-hr. day with 3 men. There is also a mold for making 12-in. blocks for which there is some demand.

A 7½-hp. General Electric motor drives the flat mixer pulley through Gates Vulco Ropes. A clutch on the mixer drive controls the hoist operating the skip bucket. A flat belt from another pulley on this shaft operates

(Continued on page 79)

The new plant of the Concrete Products Co., Tucson, Ariz., with storage yard at left.

By D. R. (Spec) COLLINS

UNCOVERING LEADS FOR DEVELOPING POTENTIAL SALES

THAT well-known marketing expert, Kenneth M. Goode, has proposed a law of sales effort that reads: "Every sales organization to hold its own must every year actively solicit its own weight in customers."

That is, if a sales organization has 200 active customers on its books, it must make a bid for new business with 200 new customers. This is based on the assumption that many businesses each year lose about one-third of their old customers and that solicitation of prospective customers will average about one-third successful. In this fashion the lost customers and the new customers are made to balance. These figures, of course, may vary, but as a whole and over a period of years I believe you will find them basically sound.

Now, if you're considering holding your own or increasing your business during the coming construction season, you're undoubtedly asking yourself this question, "Where is my 1938 crop of new customers coming from; how and where am I going to find them?"

You probably feel that you have "contacted" every possible outlet in your market. Perhaps you have; but then there are always ways and means of uncovering leads to potential sales. It is easy to fall into a "groove" — not only in the calls one makes — but in the manner of digging out leads that will result in new business. This business of selling in the building-material field has become so well organized, so competitive, that we've just got to exercise more ingenuity in *finding* our leads than we did a few years back. And more than that, we've got to uncover leads that mean business to our *customers,* or potential customers.

Gone are those days when all we had to do to sell our products was to sell the contractor on the job. Now we've got to go back farther than that. First, we've got to do creative selling — create jobs that will use our material and that we can pass on to our contractor customers.

Now, where to find those potential jobs, how to develop leads that will result in more business. That requires head work as well as leg work. The salesman who keeps his eyes open for the unexpected "breaks", can discover many sales tips and leads in the apparently monotonous routine of his every-day work.

Here are some of those every-day occurrences that wide-awake salesmen can, with a little vision, translate into sales opportunities. These are not the regular routine of getting business; that is why they're given here.

1. *Old Customers.*—Many salesmen seem to feel that an old customer will be offended if he is asked to suggest other business outlets. The fact is, in most cases he will find just the opposite true. Scrap though they may for individual jobs, you'll find contractors are, under the skin, a clannish lot. True, they're not going out of their way to help you sell your products, but if you ask for help in lining up a new customer, you'll find them willing to assist in the majority of cases. Occasionally I've known them to go so far as to arrange a meeting for a live-wire salesman who has given them good service and whose products seem to fit their needs better than the average.

Any salesman who, through a quality product, and meritorious service has built up a good customer, is overlooking a valuable method of cashing in, if he fails to ask the assistance of that customer in developing further business. Actually old customers can be your most profitable source of leads. And, if intelligently handled, this method of getting new business can prove an endless chain.

2. *News Items.*—There is scarcely a day goes by that some news item does not contain a tip on new business, if we know how to interpret it and carry it out. To most salesmen the news item is just that, a news item. But to the man who trains his brain automatically to ask the question, "Can't I cut in on that some way?" the daily paper can prove a gold mine in disguise. Tips on new companies, new products, new uses, new offices, changes in addresses, new contracts awarded; all may require some structural change of the building of the firm mentioned. Perhaps it's a new driveway, or a partition, or a floor. No matter how small it may be, remember this: it may be just the sort of job one of your customers or someone you'd like to have as a customer would like to do. It may not use much of your material and may not justify more than a 'phone call for follow-up; but you never can tell when such a follow-up will prove profitable. The biggest concrete product job that I know of in the Middle West was landed because an alert concrete-products man interpreted a tiny news dispatch from Washington as a lead, got busy on the long-distance 'phone and was firmly entrenched when his competitors learned of the job.

3. *Leads from Advertising.*—Every day you probably receive from two to a dozen direct-mail pieces from people who have something to sell

you. One manufacturer I know never throws these away until he has carefully classified them. Then, as he gets time he follows up these people, stating that he has received their advertising, that it has impressed him and at the same time fishes for any leads that they might have that would mean business for him. Of course, they'd like to sell him, but, cleverly enough, he lets them know that if they expect to do that, they, in turn, must help him get business. It's the old reciprocity game, of course, but it's a new angle of approach.

4. *Leads from Exhibits and Conventions.*—A constant curiosity about how "the other fellow" solicits business often results in new ideas that you can apply to your own business. Every man who sells should occasionally attend exhibits, fairs, conventions to get new slants on selling and to broaden his perspective. If he attends such an exhibit or convention with his mind made up that he is going to bring back at least a half-dozen new ways to go after business, he'll probably come back with a dozen.

5. *Leads from Conversations.*—More than one alert salesman has dug up his most profitable lead through social contacts. Certainly it can not be considered unethical to keep one's ears open as other people talk. Even in talks with prospects and old customers you're likely to pick up some leads that you can follow up without betraying their confidence. But to do that you've got to be alert with a mind trained to dig under the surface for facts that can be translated into terms of business for *you.*

6. *Leads from Business Contacts.*—Surely in building up your list of 1938 customers you'll want to get as much help as you can from your business contacts, from the people who supply you. They should be interested in giving you these tips as the more of them you can cash in on, the more business they're likely to do with you. One products manufacturer I know places a definite responsibility on his suppliers for bringing in four or five leads to new customers or new business every month. In this way he has considerably expanded his sales force at no cost to himself, and, because these men know that he is depending on them for this information, they go out of their way to get it for him.

You'll notice that I said nothing in the above about the orthodox ways of getting new business — your regular legwork, merchandising and advertising. They, of course, are obvious necessities in the development of your new crop of 1938 customers. The things I have listed are suggestions of how regular selling might be augmented — might be made more profitable. Everything I have said might resolve itself this: Are you on your toes? Are you awake to opportunities? Do you know a lead or an opportunity for a sale when it stares you in the face? If you do, you won't have to worry much about 1938 or any other year.

Tucson (from page 77)

the mixer. This belt can be thrown off and the concrete diverted through the other side of the divided chute when special units are to be made by hand. A W. E. Dunn Mfg. Co. Model DX 37H hand-operated tile mold is used for making a variety of roofing tiles. Other special units made by hand include Christmas-tree stands and many odd sizes and types of bricks and

The mixer with clutch, motor and V-belt and flat belt drives at left.

blocks. A Concrete Equipment Co. hand spray machine is used to color the various products. Waterproofed Colorcrete made by Colorcrete Industries, Inc., is used in a variety of colors. Compressed air for this spray is supplied by a small Concrete Equipment Co. portable compressor which is driven by a ½-hp. Master electric motor. The blocks colored in this manner are sold under the trade name of Color-Fused Fixcrete. They are available in 30 waterproof colors and shades.

The blocks or other products being made are stored on racks in the building overnight and are piled up in the yard the next day. They are then covered with burlap and sprayed by hose for 21 days before they are shipped. An attractive display of the various products is maintained in the combined showroom and office in one corner of the plant.

The 10-cu. ft. skip bucket which charges the mixer with aggregates and cement.

Plans Earth Plant

The Louisiana Boganite Corp. was recently organized to exploit the concentrated fullers' earth deposits near Bogalusa, La., and plans construction of a modern processing plant, with a capacity of 240 tons daily, on the Gulf, Mobile & Northern R.R. near Bogalusa.

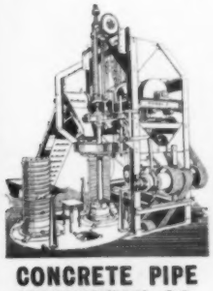
The corporation owns or holds leases on 1790 acres of fullers' earth deposits about four miles southwest of Bogalusa. Preliminary exploration revealed that about 7,000,000 tons of earth and clay of good quality are on these lands. Test holes, drilled to a depth of 74 ft. in one instance, justified commercial development.

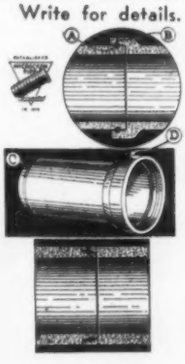
---

5 Reasons Why You Should Choose The Dual Packer Head Machine for Better Concrete Pipe Production

1. The Dual Packer Head offers the greatest economy in producing 4 to 36 inch pipe.
2. It enables you to operate on either full or partial production basis with smaller crews.
3. It eliminates pallets, allowing immediate stripping of molds.
4. It permits you to lease a portable unit to take care of those distant jobs at a profit.
5. Finally, it produces a superior pipe, highly resistant to abrasion and corrosion, and provided with New Sealtite Joint preventing leaks and excessive infiltration—a pipe Guaranteed to stand up.

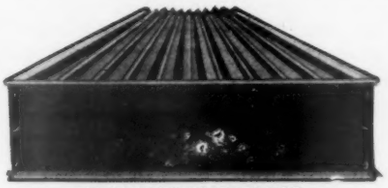
Write for details.





CONCRETE PIPE MACHINERY CO.,
SIOUX CITY, IOWA

PROFITS



TEN-GANG JOIST MOLD

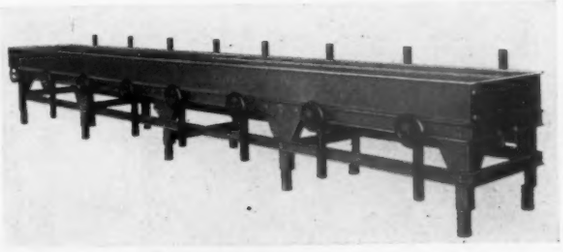
AWAIT YOU IN THE MANUFACTURE OF CONCRETE JOISTS

THE necessity for lower building costs has created a rapidly growing demand for **pre-cast concrete products** which can be used in all forms of construction with a large saving in time and labor.

You can cash in on this waiting market in your own locality by supplying concrete joists and reinforced slabs for mill, factory and residence buildings—shipping platforms and fireproof floors of all kinds. Once you have started, you can expand your business to include the manufacture of concrete blocks and bricks; reinforced pipe for sewers, culverts and drainage tile; and a great variety of molded parts such as posts, sills, ties and concrete ornaments.

CRESCENT Vibrating Equipment has been developed by R & L engineers to do this molding work — not only with speed, accuracy and economy — but to insure super-dense concrete units of maximum strength and uniformity. The secret of success in this business is to give your customers **service satisfaction** in the pre-cast products they buy and use. Crescent machines are guaranteed to do that, because of the "Vibrating principle" which insures a perfect mixture of sand, stone and cement of proven high quality.

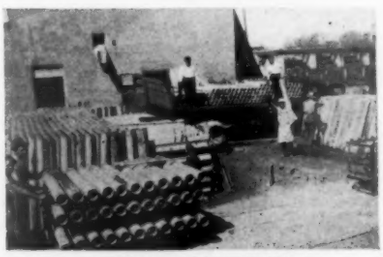
Write for Bulletins today



CEMENT JOIST MACHINE

CONCRETE PIPE MOLDS
All Sizes and Styles Concrete Pipe and Tile.

PIPE MACHINES
All Sizes and Styles Concrete Pipe up to 60" dia., 4' length.



CONDUIT MACHINES
Small Diameter Conduit in Lengths up to 5 feet.

R & L CONCRETE MACHINERY CO.

KENDALLVILLE **INDIANA**

WANTED!

5,000,000 TONS OF STABILIZED AGGREGATES

FOR:

- Maintenance of State Roads
- Farm-to-Market and Secondary Roads
- Base Courses on Primary Highways
- Streets and Alleys
- Pavement Shoulders
- Park and Cemetery Drives
- Residential and Private Drives
- Parking Areas
- Amusement Parks, Race Tracks, etc.

WHO'S going to fill this order, a conservative estimate of the stabilized mixture that will be required during 1938 by state, county, township and city road organizations and by private enterprises?

It's the aggregates producer's field—his new source of added profits—if he takes advantage of it.

Already the Michigan State Highway Department has contracted for 302,560 cubic yards of plant-mixed stabilized gravel, for use in maintenance on state roads alone. All maintenance gravel used by this state is now pre-stabilized with clay and calcium chloride before it is used on the roads. In awarding contracts for the 1938 construction of 185 miles of stabilized base courses, for which 232,709 cubic yards of stabilized gravel will be required, Michigan again stipulated that the material must be plant-mixed. Adding to this the fact that the state, county, township and city organizations will build many miles of stabilized roads, streets, alleys and pavement shoulders, it is safe to predict that, in this one state alone, 1,000,000 tons of calcium chloride stabilized mixture will be used this year. The market is just as great in other states, many of whom already have stabilization programs as large as Michigan's.

From all indications, the use of loose gravel for road surfaces or base courses will soon be obsolete, and the alert aggregates producer will put himself in a position to supply pre-mixed stabilized material THIS SPRING.

ABOVE: Screening materials at pit.

RIGHT: The pug-mill—heart of the mixing plant.

WRITE FOR DETAILS—Learn how you can take advantage of this opportunity for new profits, by writing TODAY to any of the firms listed below. Just say, "I'd like to know more about the stabilized-aggregates business".

CALCIUM CHLORIDE ASSOCIATION

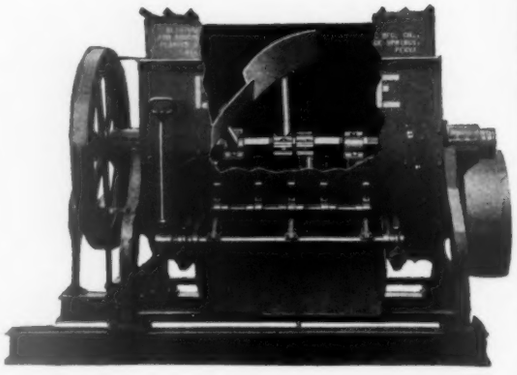
Michigan Alkali Co., 60 E. 42nd St., New York City
Solvay Sales Corp., 40 Rector St., New York City
The Columbia Alkali Corp. • • Barberton, Ohio
The Dow Chemical Company, Midland, Michigan

CALCIUM CHLORIDE
FOR STABILIZING ROAD SURFACES

PROFITABLE

Satisfy YOUR Customers by using the NEW BLYSTONE MIXER and REDUCE Mixing Costs

A GOOD MIX is the very foundation of a successful Concrete Products business. If your mix is right your blocks will be of the high quality that satisfies customers. We all know that no business ever succeeds and makes money unless the customers are satisfied. The NEW Blystone Mixers with many improved features give you a THOROUGH MIX at the lowest possible cost. Those who have replaced their old Mixers with the NEW Blystone have found it paid in many ways. Why not check into your mix problem? Are you handicapped with a bad mix? When making comparisons use the NEW Blystone models—NOT old ones.



Blystone Mixer Model B-4

BLYSTONE *to Make and Sell* FLAM *Concrete Block Equipment*

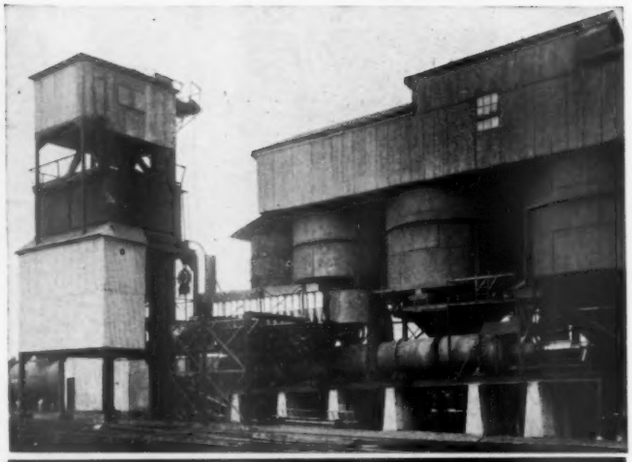
The Blystone Manufacturing Company has the sole right to manufacture and sell FLAM Concrete Block Equipment east of the Rocky Mountains. This new method of making Concrete Units took the recent Concrete Show by storm,—this revolutionary principle is the greatest forward step the industry has ever known. It works on the vibration principle. NO TAMPING. There are no gears, clutches, or other parts that cause so much trouble. The initial cost is far less than present equipment. The labor and upkeep are also much lower. It will pay to investigate this new machine before you buy. Write today for details.

Write at once for Information and Prices

BLYSTONE MFG. CO.

338 Arch Street

CAMBRIDGE SPRINGS PENNSYLVANIA



WARREN ASPHALT PLANTS

HOT MIX —— COLD MIX

—— OR ——

COMBINATION UNIT FOR BOTH TYPES

CAPACITY DESIGN AND ARRANGEMENT TO MEET ANY REQUIREMENTS

Designed and Built

—— By ——

WARREN BROTHERS ROADS CO.

P. O. BOX 1869

Boston Massachusetts

THE HOTEL of THE MONTH

Raleigh Hotel

WACO, TEXAS

ALBERT

PICK HOTELS

You'll get more for your money at Pick Hotels. Spacious, comfortable rooms. Delicious food and real personal service. All at moderate prices.

CHICAGO, ILL.	GREAT NORTHERN	HOTEL
DETROIT, MICHIGAN	TULLER	HOTEL
DAYTON, OHIO	MIAMI	HOTEL
COLUMBUS, OHIO	CHITTENDEN	HOTEL
COLUMBUS, OHIO	FORT HAYES	HOTEL
TOLEDO, OHIO	FORT MEIGS	HOTEL
CINCINNATI, OHIO	FOUNTAIN SQUARE	HOTEL
CANTON, OHIO	BELDEN	HOTEL
SOUTH BEND, INDIANA	OLIVER	HOTEL
INDIANAPOLIS, INDIANA	ANTLERS	HOTEL
ANDERSON, INDIANA	ANDERSON	HOTEL
TERRE HAUTE, INDIANA	TERRE HAUTE	HOUSE
ASHLAND, KENTUCKY	VENTURA	HOTEL
OWENSBORO, KENTUCKY	OWENSBORO	HOTEL
JACKSON, TENNESSEE	NEW SOUTHERN	HOTEL
ST. LOUIS, MO.	MARK TWAIN	HOTEL
WACO, TEXAS	RALEIGH	HOTEL

PICK HOTELS

WHENEVER YOU SEE THE WORD PICK THINK OF ALBERT PICK HOTELS

Proven OPPORTUNITY
3 MILLION DUNBRIK SOLD FIRST YEAR

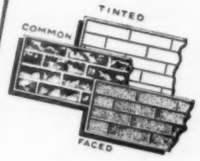
You will realize after reading Mr. Rose's letter what an outstanding local manufacturing business he has established in one year in the small city of Goldsboro, N. C. His production costs and selling prices prove the excellent earning power of DUNBRIK Line-Production Plant.

Mr. Rose's success is but one example. Let us tell you too about the many other successful DUNBRIK Manufacturers in this and foreign countries—

How their business is exclusive, protected by franchise — how the wonderful Line-Production DUNBRIK Machine turns out superior products at lowest cost — Why DUNBRIK offers permanent, air-cell insulation and hollow wall construction at the cost level of frame—And how it can be supplied in a wider range of colors than any other masonry material.

Write today for the new book "4 Keys to Success" just off the press. For you too it may mean success and manufacturing independence, just as it has for Mr. Rose. Do it now while your territory is still open.

W. E. DUNN MFG. CO.
420 W. 24th St. - Holland, Michigan



W. P. ROSE BUILDERS SUPPL
(INCORPORATED)
MANUFACTURERS OF
Dunbrik and Dunstone
GOLDSBORO, N. C.

MR. W. P. ROSE

W. E. Dunn Mfg. Co.,
Holland, Mich.

Dec. 21, 1937.

Gentlemen:

I am pleased to give you the cost of manufacturing Dunbrik stacked on the yard ready for delivery, as follows:

1250#	Fine Sand	
1250#	Coarse "	
1250#	Pea Gravel	
3750#	Net aggregate cost	$1.50
6	Bags Cement @ 60¢	3.00
	Labor per M	1.10
	Power (Electric)	.10
	Plant Overhead	.30
	Total	$6.00

The above estimate is based on 1000 brick. When we use steam for curing it adds to the cost 25¢ per M. This, however, is not necessary, only when the mean temperature is below 70 degrees.

Our sales for the first year amounted to three million brick. Our annual capacity, if the plant is run regularly, will amount to three and one half million brick.

Our Dunbrik retail F.O.B. Plant at $12.50 per M, and our customers are our very best salesmen.

We have here a clay brick plant that can turn out 100 million brick annually and has been in business for twenty-five years. Yet we have found a ready sale for our product and we know of no dissatisfied customers.

Yours very truly,

W. P. Rose

W. E. DUNN MFG. CO. 420 W. 24TH ST., HOLLAND, MICH.

HELTZEL BIN EQUIPMENT . . .

Whenever or wherever storage, batching or bulk cement plants are needed Heltzel-built equipment has always been the leader in point of service, ease of installation, economy of operation and length of service. Portable bins, built to suit the requirements of the concern whose base of operations change from place to place, are the only PORTABLE bins on the market.

Standard Circular, Square and Oblong bins, ranging in capacity from 35 to 500 tons, available in one, two, three and four compartments, featuring convertibility from one to two or three or four compartments without making alterations or changes in weighing or batcher equipment, make specially built or designed equipment almost unnecessary.

Bulletins S-18-B and S-21-B, describing in detail these plants and their varied applications, are ready. Write today for your copies.

Heltzel
BUILDS IT BETTER

- BINS, Portable and Stationary
- CEMENT BINS, Portable and Stationary
- CENTRAL MIXING PLANTS
- BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)
- BITUMINOUS PAVING FORMS
- ROAD FORMS (with lip curb and integral curb attachments)
- CURB FORMS
- CURB-AND-GUTTER FORMS
- SIDEWALK FORMS
- SEWER AND TUNNEL FORMS
- SUBGRADE TESTERS
- SUBGRADE PLANERS
- TOOL BOXES
- FINISHING TOOLS FOR CONCRETE ROADS

HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO, U.S.A.

MULTIPLEX *Streamlined* WALL BLOCKS
Stole the Convention for . . . BEAUTY . . . TRUE UNITS . . . TEXTURE

Patent Applied For

SIX POINTS OF QUALITY

- ★ *4 Bar split Tamper; independent front and rear tamping.*
- ★ *Counter-balanced crankshaft free from vibration.*
- ★ *Positive automatic feeder.*
- ★ *Quick change of mold boxes.*
- ★ *Welded steel frame.*
- ★ *Built strong for heavy duty.*

Mixers
•
Power Tampers
•
Power Presses
•
Hand Presses
•
Flue Block Machines
•
Hand Tamp Machines

MULTIPLEX CONCRETE MACHINERY CO.
Write for Latest Catalog ∴ ∴ ELMORE, OHIO

PROFITABLE NEW PRODUCTS

. . . . . after thorough investigation and point-by-point comparison of construction and performance features, leaders in the ready mixed concrete industry choose

McCRADY-RODGERS CO. PITTSBURGH, PA.

LOIZEAUX BUILDERS SUPPLY CO. ELIZABETH, N. J.

SUPER CONCRETE CORP. WASHINGTON, D. C.

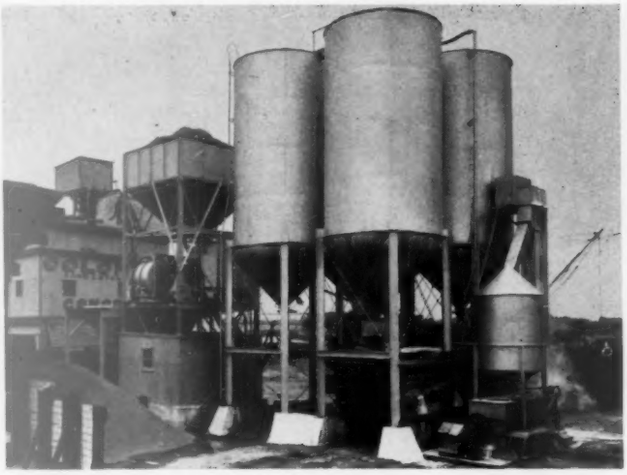
BLAW-KNOX TRUKMIXERS

Compare Values Before YOU Buy

. . . the closest scrutiny will convince you and justify your selection of Blaw-Knox TRUKMIXERS *and* AGITATORS.

BLAW-KNOX DIVISION
OF BLAW-KNOX CO.
Farmers Bank Bldg., Pittsburgh, Pa.
offices and representatives in principal cities

Completely described in the New Blaw-Knox catalog No. 1582.
SEND FOR IT



Produce Aged Lime Putty by the Brooks-Taylor Method

The Brooks-Taylor process is a method of producing and handling aged lime putty for use in making brick mortar, plaster and stucco. Write our nearest office for information on a plant to meet your requirements.

CHICAGO BRIDGE & IRON COMPANY

Chicago.....2451 Old Colony Bldg.
New York..3389—165 Broadway Bldg.
Cleveland.....2264 Rockefeller Bldg.
Philadelphia...1645—1700 Walnut St.
Boston....1550 Consolidated Gas Bldg.
Houston.....2919 Main Street
Tulsa.....1648 Hunt Bldg.
Birmingham....1503 North Fiftieth St.
Dallas.....1486 Liberty Bank Bldg.
Detroit.....1552 Lafayette Bldg.
San Francisco.....1092 Rialto Bldg.
Los Angeles.....1457 Wm. Fox Bldg.

Plants at BIRMINGHAM, CHICAGO & GREENVILLE, PA.

QUINN PIPE FORMS

HAND or WET PROCESS

Make concrete pipe on the job with QUINN PIPE FORMS. Quinn Pipe Forms can be handled by less experienced labor and produce uniform concrete pipe of highest quality. The recognized standard of all concrete pipe.

HEAVY DUTY CONCRETE PIPE FORMS

Built to give more years of service—sizes for any diameter pipe from 12 to 84 inches—tongue and groove or bell end pipe—any length. Backed by years of service in the hands of contractors, municipal departments and pipe manufacturers.

NEW MEDIUM DUTY CONCRETE PIPE FORMS

Meet the demand for low cost equipment that produces a uniform quality of pipe in smaller amounts. Complete in every way. Stands up on any job. Same sizes as "Heavy Duty," from 12 to 84 inches—any length.

WRITE TODAY

Get complete information on prices and Special Construction features of Quinn Pipe Forms. Give us size of job for estimate on your pipe form needs.

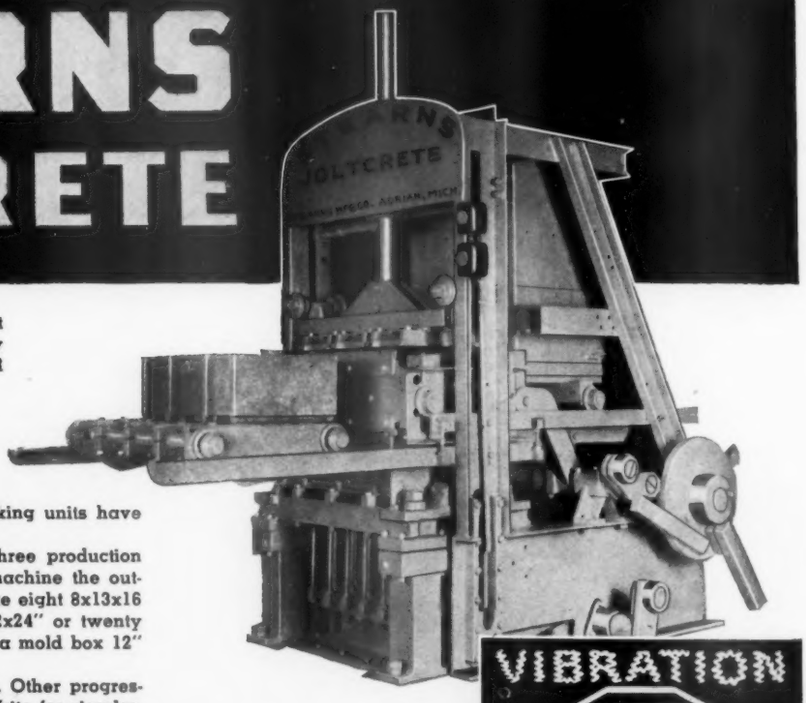
Also manufacturers of concrete pipe machines for making pipe by machine process.

QUINN WIRE & IRON WORKS

1627 TWELFTH ST. BOONE, IOWA

The machine that is revolutionizing an Industry!

STEARNS JOLTCRETE



NOT a press — not just a vibrator feeder — but a machine that actually PACKS the concrete by vibration — 7200 sharp jolts per minute, UNDER PRESSURE.

This machine, employing the patented method of limited amplitude vibration, permits the use of aggregates of higher fineness modulus and concrete of lower water-cement ratio. Thus, using a leaner, drier mix, it produces more concrete units per bag of cement — and better looking units have never been made.

It's the fastest machine on the market — two to three production cycles per minute. That means with TWO men at machine the output per minute is nine 8" blocks. Each cycle you make eight 8x13x16 or 18", six 8x4x16 or 18", eight 2x12x24", four 4x12x24" or twenty brick, or any other combination of units that will fit a mold box 12" high and 18x24" in area.

In one plant it has made more than a million units. Other progressive products plants are installing these machines. Write for circular.

STEARNS

MANUFACTURING CO. - ADRIAN, MICH.

Gene Olsen, Presideut

Manufacturers of Stearns Power Strippers, Stearns Clipper Strippers, Mixers, Skip Loaders, Brick Machines, Manhole Block Machines and Straub Oscillating Attachments.

VIBRATION UNDER PRESSURE

"SPOT IT ON THE JOB"
—THAT'S WHAT CONTRACTORS DEMAND!

DUMP THE BATCH WHERE IT'S WANTED
—and get out without help!

MAYBE you, too, have watched one of those big, expensive, single-driving-axle trucks bog down while backing into dumping position and sink deeper with each revolution of the mixer—*then cry for help to get out!*

Help means TRACTION! And that's exactly what you get when your mixer is mounted on a 1½-to-3-ton truck equipped with Thornton Four-Rear-Wheel Drive.

With Thornton dual-ratio transmission doubling the power of the engine and distributing the increased power equally to *two live axles*—you've got two axles driving—eight tires supplying traction—and eight tires to keep the load from sinking—and speeds up to 35 miles per hour on the pavement.

Before you buy ANY truck for dump, shovel or mixer operation, learn how the Thornton-engineered lighter truck is equipped to handle perfectly balanced loads up to 13 and 15 tons (Gross Vehicle Weight)—see how much you save compared with the cost of big trucks of equal carrying capacity . . . Thornton Tandem Company, 5143 Braden Street, Detroit, Michigan.

CHOOSE YOUR 1½- to 3-TON CHASSIS..have it

THORNTON-eered for TRACTION

A PROVEN *Business Opportunity* FOR 1938

From many towns of a few thousand population to the largest cities, the ever-growing demand for Jaeger Dual-Mix Higher Strength Concrete, replacing bulk materials, offers one of the outstanding opportunities for sound and profitable new business investment and the expansion of existing concrete plants.

HERE IS HOW DEMAND FOR JAEGER TRUCK-MIXED CONCRETE GROWS AND GROWS

These 25 Typical Operators Have Ordered and Reordered an Average of 5 Times Each, for a Total of 409 Jaeger Units

Atlanta Aggregate Co., Inc., Atlanta, Ga.	Has Placed	3	Orders, for a Total of	6 Jaeger Units.
Beckley-Myers, Springfield, Ohio	Has Placed	3	Orders, for a Total of	5 Jaeger Units.
C. W. Blakeslee, New Haven, Conn.	Has Placed	4	Orders, for a Total of	10 Jaeger Units.
W. H. Brant & Sons, Inc., West View, Pa.	Has Placed	5	Orders, for a Total of	5 Jaeger Units.
Brooks-Wright, Inc., Paterson, N. J.	Has Placed	3	Orders, for a Total of	4 Jaeger Units.
J. P. Callaghan Co., Newark, N. J.	Has Placed	4	Orders, for a Total of	17 Jaeger Units.
Clark Transportation Co., Honolulu, H. I.	Has Placed	4	Orders, for a Total of	12 Jaeger Units.
Cline & Ellis, Raleigh, N. C.	Has Placed	2	Orders, for a Total of	6 Jaeger Units.
Consolidated Rock Products Corp., Los Angeles, Calif.	Has Placed	2	Orders, for a Total of	14 Jaeger Units.
Dufferin Paving & Crushed Stone Co., Ltd., Toronto, Ont.	Has Placed	4	Orders, for a Total of	26 Jaeger Units.
Fort Worth Sand & Gravel Co., Ft. Worth, Tex.	Has Placed	5	Orders, for a Total of	17 Jaeger Units.
Goff-Kirby Co., Cleveland, Ohio	Has Placed	3	Orders, for a Total of	10 Jaeger Units.
Graham Bros., Los Angeles and Long Beach, Calif.	Has Placed	6	Orders, for a Total of	16 Jaeger Units.
Haden Co., Houston, Tex.	Has Placed	10	Orders, for a Total of	22 Jaeger Units.
Howard Concrete Producing Co., Cincinnati, Ohio	Has Placed	10	Orders, for a Total of	21 Jaeger Units.
Keefner Concrete Co., Des Moines, Ia.	Has Placed	8	Orders, for a Total of	11 Jaeger Units.
Knoxville Sangravl Material Co., Knoxville, Tenn.	Has Placed	4	Orders, for a Total of	6 Jaeger Units.
Kuhlman Builders Supply & Brick Co., Toledo, Ohio	Has Placed	9	Orders, for a Total of	16 Jaeger Units.
P. W. Lambert & Co., Linden, N. J.	Has Placed	3	Orders, for a Total of	7 Jaeger Units.
Maloney Concrete Corp., Washington, D. C.	Has Placed	7	Orders, for a Total of	44 Jaeger Units.
J. & I. O'Rourke, Flushing, L. I.	Has Placed	6	Orders, for a Total of	28 Jaeger Units.
Richter Transfer Co., Cincinnati, Ohio	Has Placed	12	Orders, for a Total of	40 Jaeger Units.
Ryan Ready-Mix Concrete Co., Brooklyn, N. Y.	Has Placed	7	Orders, for a Total of	22 Jaeger Units.
H. L. Seabright Co., Wheeling, W. Va.	Has Placed	18	Orders, for a Total of	22 Jaeger Units.
Warner Co., Philadelphia, Pa.	Has Placed	8	Orders, for a Total of	22 Jaeger Units.

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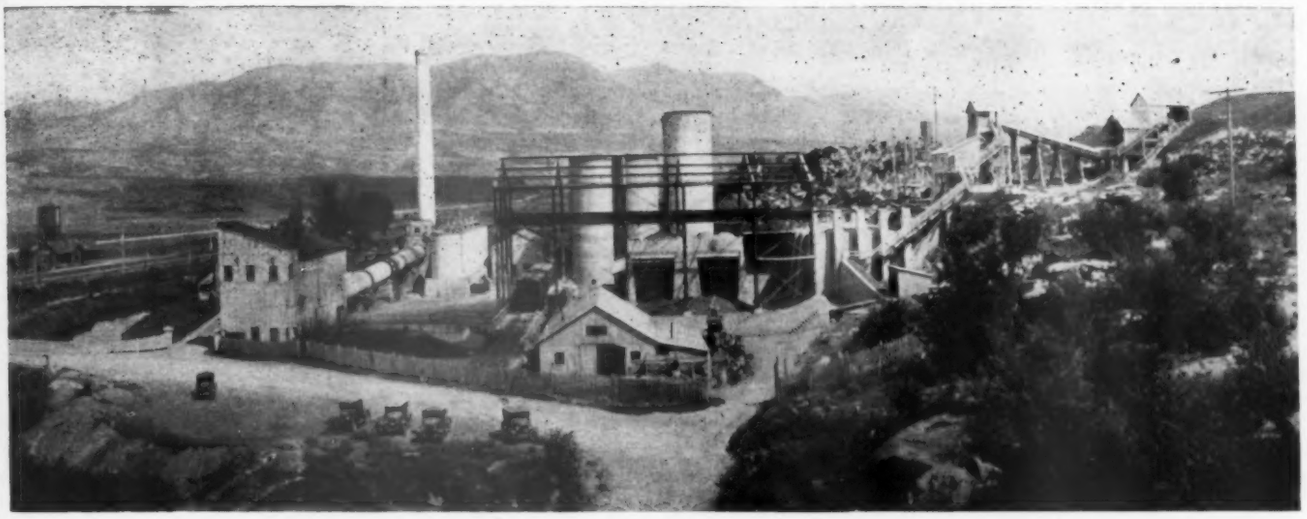


CAPACITY UP 50% SINCE 1929 OPENING

The mountain of shattered limestone and shale from which raw materials are obtained. Limestone quarry is in foreground and shale quarry in background.

The plant of the Idaho Portland Cement Co. at Inkom, Idaho. The quarry and crushing plant are in the right background and the office and laboratories are in the left foreground.

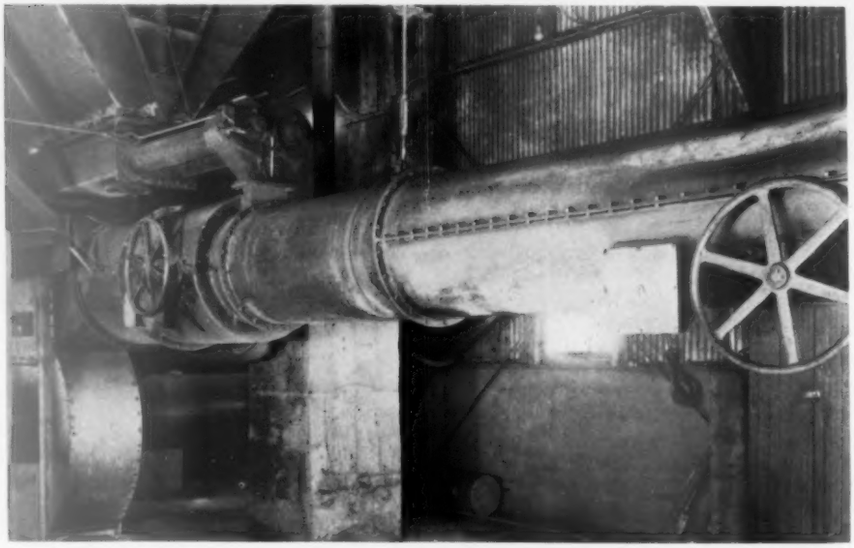
ANYONE visiting the plant of the Idaho Portland Cement Co. at Inkom, near Pocatello, Ida., to-day would probably not recognize it as the same plant which went into operation late in 1929. Built under pressure to meet the urgent demand for cement in this territory at that time, the plant began production before construction had been entirely completed. Some improvements were made to the plant during the depression and other improvements made in the past few years have brought this plant up into the front rank of the industry. Among the benefits obtained from these improvements was an increase in plant capacity from the original 800 bbl. to over 1,200 bbl. daily in spite of the harder burning necessary in making present-day cements.

When the quarry was first opened the material obtained formed an almost perfect blend. Since then its character has changed somewhat as have also the cement specifications, and shale and silica from other sources are added. A shale quarry near the plant was opened in 1933 and this has made it possible to control the blending of the raw material within closer limits than formerly. A slight silica deficiency in this shale requires the addition of small amounts of this material, which is delivered by truck from local sources.

In over eight years of operation only a dent has been made in the vast mountain of shattered limestone and shale which remains the chief source of supply. What little drilling is necessary is done with jackhammers. Usually the material needs only to be rodded

down from the bank and loaded into cars for haulage to the plant. A Bucyrus-Erie ¾-cu. yd. Diesel shovel is used for this purpose and a General ½-cu. yd. gasoline shovel is used in the adjoining shale quarry. These materials are brought about ¼ mi. to the plant in side-dump quarry cars hauled by a 4-ton Plymouth gasoline locomotive.

product of this crusher to the Gruendler hammer-mill, the product of which is discharged into raw-material storage bins holding a total of 800 tons. The crushing plant is operated only 6 hr. daily 6 days a week to supply the plant's needs. The smaller former capacity required 7-day operation of the old crushing plant for 10 to 12 hr. daily.



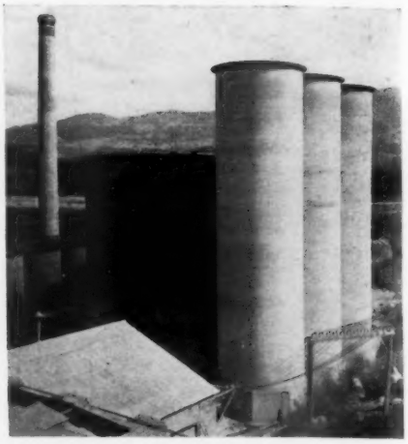
The special burner and the old bin system of coal feed. This burner will be used with a direct-firing coal pulverizer now being installed.

Of the original crushing plant, only the storage bins remain. The original small jaw crusher and hammer-mill were replaced in 1930 by a larger hammer-mill, and early in 1937 a new jaw crusher was added. The raw materials are now dumped from the

The 4-ton gasoline locomotive with trainload of stone at the crushing plant.

cars into a hopper from which a Traylor pan-feeder supplies the 28-in. by 36-in. Traylor Bulldog primary jaw crusher. A belt-conveyor carries the

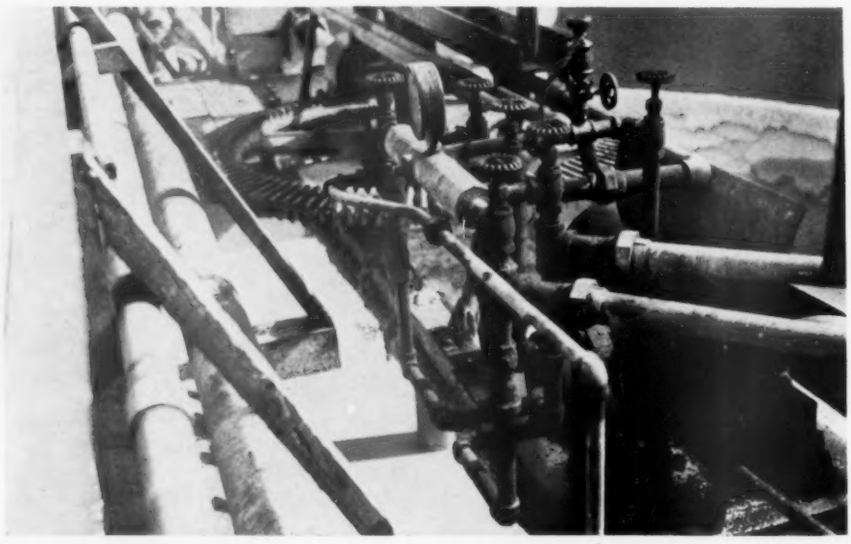
Blending of the raw materials was originally accomplished by drawing them in the desired proportions from this bin with a belt-conveyor. A bucket-elevator was used to supply the raw-mill feed bins. An open storage system served by an overhead traveling crane was installed in 1931 to replace this and the former gypsum and clinker storage system. In 1935 the old raw-mill feed bins and their table feeders were replaced by two



The cement-storage system with three new silos at right.

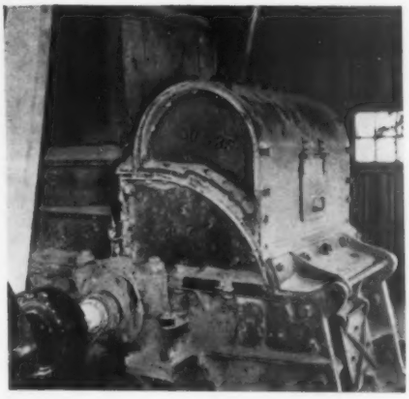
bins inside the storage. Hardinge constant-weight feeders under these bins proportion the limestone and shale on a belt-conveyor which feeds the 8-ft. and 7-ft. by 26-ft. Allis-Chalmers wet-grinding Compeb mill.

As before, the slurry is transferred from the mill into any one of five 20-ft. dia. by 25-ft. conical-bottom steel slurry tanks. Three of these tanks are ordinarily used for storage, one for mixing and one for kiln feed. In 1932 a Wilfley pump replaced the original slurry transfer pump serving these tanks. In 1936 Manitowoc Minogue mechanical-and-air agitators replaced the original air-agitation system used. These agitators are controlled automatically so that each tank gets air agitation for alternating 5-min. periods at 20-min. intervals. The air is released from four points at different radii on the mechanical agitator paddles to insure the thorough mixing and blending of the entire contents of each tank.

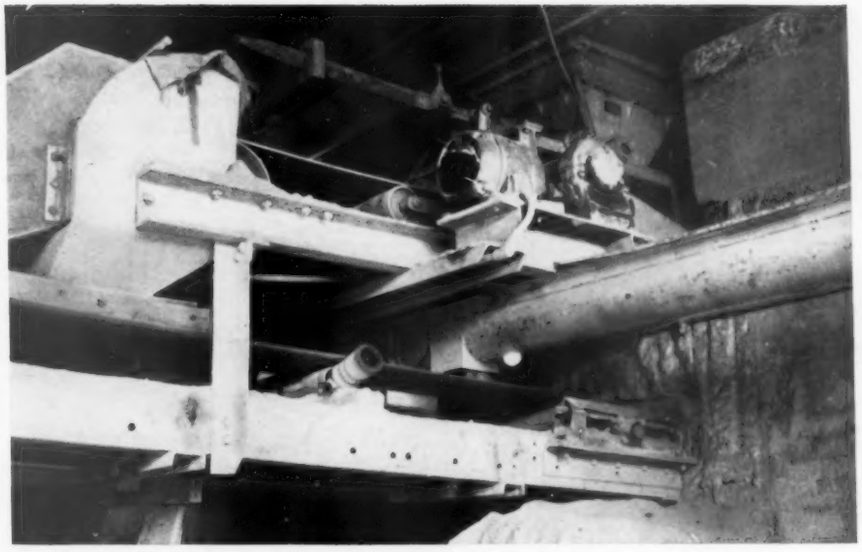


Close-up of the control system for air agitation of one of the slurry tanks.

Slurry is pumped from one of these tanks to the original Ferris-wheel kiln feeder, which is now driven by chain from a ring gear at the feed end of the kiln. This drive insures a steadier rate of slurry feed to the kiln than was possible with the former separate motor drive. Buckets are removed or added as desired to change the rate of feed. Any slurry that may overflow is pumped back into the feed tank. The ring gear consists of a strip of channel iron, with spikes for teeth, welded to the kiln. The driven shaft is connected by a universal joint to the feeder drive gear.

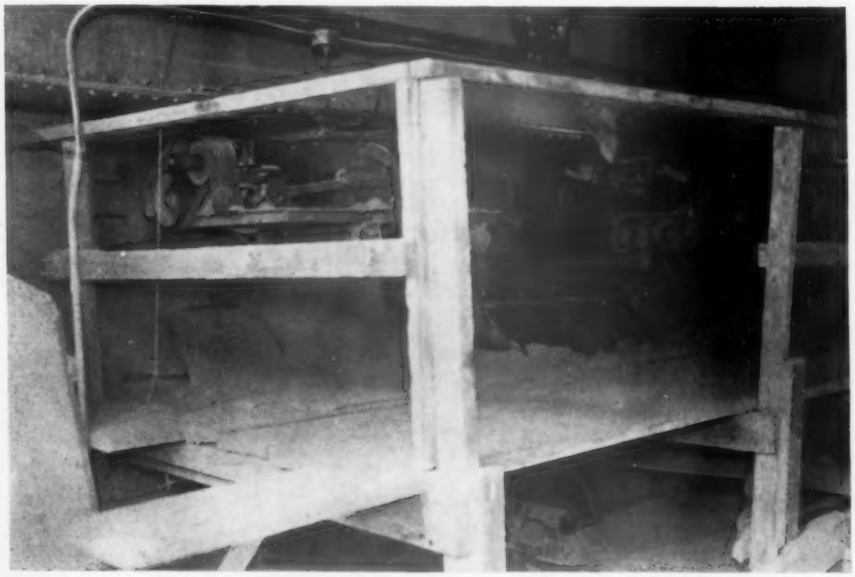


The hammer-mill which serves as a secondary crusher in this plant.



The predetermined weighing feeder and screw-conveyor which measure clinker and gypsum, respectively, on the belt-conveyor feeding the finish-grinding mill.

No change has been made in the 10-ft. by 200-ft. Allis-Chalmers rotary kiln, but an Allis-Chalmers chain system is now being installed to utilize waste heat and obtain more efficient burning. The original coal pulverizing and drying system is now being replaced by a No. 442 Raymond Bros. direct firing unit. Three years ago the drag-chain, which conveyed the clinker from the kiln to storage, was replaced by an 8-ft. and 9-ft. by 48-ft. Traylor Cheesman rotary cooler, and a Cheesman burner was installed. The 8-ft.-diameter hot end of this cooler is lined with firebrick and has special steel lifters. The 9-ft.-diameter section has a circular center compartment with the surrounding space divided into 6 horizontal flues equipped with chains. The clinker first passes from the 8-ft. section of the cooler into three of the flues, is returned countercurrent through the center compartment by means of lifters, and then passes through the other three flues. In passing through this 48-ft. cooler the clinker actually travels a distance of 96 ft. Its temperature is reduced from 2,000 to 2,200 deg. F. down to about 150 deg. F.

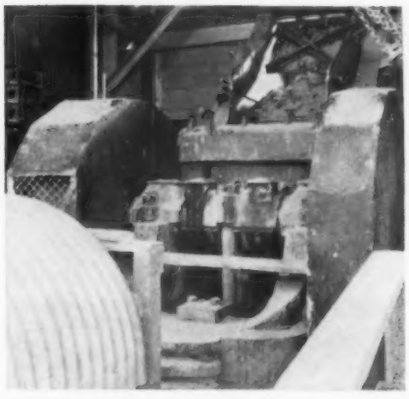


The two constant-weight feeders which measure limestone and shale on the belt-conveyor feeding the raw-material grinding mill.

There had been some trouble with false setting of the cement, but this was eliminated by the use of this cooler. The clinker can now be ground on leaving the cooler, if desired. The combination of the burner and the cooler is also responsible for improved burning conditions in the kiln, the elimination of clinker rings, and an increase in capacity. Both the soundness of the cement produced and its grindability have been improved.

This cooler supplies preheated primary and secondary air for the burner and kiln. This is drawn through a bypass into a cyclone by a Norblo fan, which blows the clean air through the burner at a temperature of about 550 deg. F. Settled dust is fed by a screw-conveyor into the clinker flow.

The clinker goes from the cooler to a drag-chain conveyor feeding a bucket-elevator, which discharges it into the clinker section of the storage. Form-

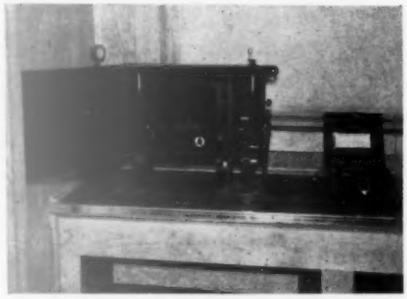


The 28-in. by 36-in. primary jaw crusher with pan feeder above.

The 8-ft. and 9-ft. by 48-ft. rotary clinker cooled with drag chain in foreground.

erly a stiff-leg derrick and clamshell bucket were used to distribute and reclaim the clinker, but these were replaced in 1931 by the storage system already described. In 1936 additional dead storage space for clinker was added. A drag-scraper serves this space. The total clinker storage capacity is abount 40,000 bbl.

The overhead crane transfers the clinker and gypsum from storage into their respective feed bins. The clinker is fed by a Schaffer Poidometer and the gypsum by a feed-screw on a belt-conveyor serving the finish-grinding mill. This equipment was installed in 1935. The use of the Poidometer and a Link-Belt P. I. V. variable-speed reducer on the gypsum screw make accurate control of feed and mix possible. The finish mill is an 8-ft. and 7-ft. by 30-ft. Allis-Chalmers Compeb machine.



The Turbidimeter which is part of the equipment in the complete laboratory at this plant.

As before, the finished cement is fed to a 5-in. Fuller-Kinyon pump, but the original wooden stock-houses were replaced in 1930 by six 8,000-bbl. concrete silos with two 2,000-bbl. star bins. In 1937 three more silos of 11,500 bbl. capacity each were built by J. T. McDowell. Cement is reclaimed from the silos by screw-conveyors. The original packhouse has been improved and contains two 3-spout Bates packers.

All of these improvements combined have made possible more economical operation, more accurate control, and a consistently high quality of product. Standard Portland cement is the only product of this plant and this has kept well ahead of the tightening specifications.

The chemical laboratory has been steadily improved and is now equipped with the latest devices, including a moist closet, a Turbidimeter, etc. A new wash and change house has just been completed. In this building is a new 500-ft. well with a 150-gal. per min. Pomona pump which supplies process and drinking water.

Road Show (from page 34)

The unprecedented attendance at this year's road show-convention and the nationwide interest in the proceedings there is an indication of the increasing public realization of the importance of roads in the economic and social life of all the people. The indications at this year's conclave all point to a banner year for the highway industry and profession.

At the conclusion of the convention the following officers were elected for 1938:

President: Murray D. Van Wagoner, State Commissioner of Highways, Lansing, Mich.

Vice-president, Northeastern District: Paul B. Reinhold, president, Reinhold & Co., Inc., Pittsburgh, Pa.

Vice-president, Southern District: E. D. Kenna, director, Mississippi State Highway Dept., Jackson, Miss.

Vice-president, Central District: Lion Gardiner, vice-president, Jaeger Machine Co., Columbus, O.

Vice-President, Western District: Stanley Abel, supervisor, Fourth District, Kern County, Taft, Cal.

Treasurer: James H. MacDonald, consulting road and paving expert, New Haven, Conn.

Directors: A. W. Brandt, commissioner of highways, Dept. of Public Works, Albany, N. Y.; Carl W. Brown, chief engineer, Missouri State Highway Dept., Jefferson City, Mo.; Frederick Hoitt, secretary, New England Road Builders' Assn., Boston, Mass.; C. J. Sherlock, first assistant engineer, Alabama Dept. of Highways, Montgomery, Ala.; Charles M. Upham, engineer-director, American Road Builders' Assn., Washington, D. C.; Charles D. Vail, state highway engineer, Colorado State Dept., Denver, Colo.; H. C. Whitehurst, director of highways, District of Columbia, Washington, D. C.

Convention (from page 64)

the layman that seems to mean that an employer must discuss working conditions with duly authorized representatives of his employees, but that, like any two groups which may be considering a mutually binding contract, either party to the discussion is free to terminate it when a failure to agree on fundamentals is reached. Yet the labor board, while piously bowing to the Supreme Court's dictum that the act does not require an actual agreement or the signing of a contract to reflect that agreement, concludes that if an employer enters into a collective-bargaining conference while entertaining mental reservations that he will not sign a contract, and if some kind of agreement is not actually reached, the employer has not bargained collectively within the meaning of the law and may be subjected to severe punishment.

"Another question over which there must be some kind of legal control in the public interest is that of jurisdictional disputes. If a union should actually organize one of our plants and that plant should then be boycotted by a competing union, the employer would immediately be caught between two fires. He need not expect the labor board to give him any relief, and yet the patience of the public has obviously been exhausted by these jurisdictional disputes. In some cases they have reached proportions which would be absurd if they were not so tragic."

O. K. Recommendation

The Division of Simplified Practice of the National Bureau of Standards has announced that Simplified Practice Recommendation R163-36, *Coarse Aggregates* (*Crushed Stone, Gravel and Slag*), has been reaffirmed without change by the standing committee of the industry.

This recommendation, which was promulgated in June 1936, consists of two tables of sizes of coarse aggregates designated as Group A and Group B. The sizes are based on sieves with square openings and each group is divided into "primary" and "combined and modified sizes." Two tables showing typical uses for Group A and Group B sizes, and a table showing approximately equivalent round and square opening testing screens are included.

D. S. MacBride
Vice-President
Hercules Cement Corp.

MEN · OF · THE · INDUSTRY

After five years with the Portland Cement Assn., as field engineer and later district engineer in charge of the Philadelphia office, Mr. MacBride became associated in 1924 with the International Cement Corp. (now Lone Star Cement Corp.) as assistant general sales manager and then successively vice-president of subsidiary companies in Indiana and Pennsylvania. The basis for the use of high-early-strength cement and the marketing methods now employed were developed in the mid-western and eastern states under Mr. MacBride's direction. In 1931 he was placed in charge of "Incor" sales and advertising activities for the entire company. Now Mr. MacBride has resigned as manager of the "Incor" division, Lone Star Cement Corp., to become vice-president of the Hercules Cement Corp. He will direct the sales activities of the Hercules Cement Corp. from the company's Philadelphia office.

Personal Mention

W. S. RABB, general contractor at Palm Springs, famous desert resort in southern California and associated in the ownership of the Mortarless Concrete Block Co. of Palm Springs, is planning to establish another block plant at Twenty-Nine Palms, Cal.

EARL BARNETT, superintendent of the Contra Costa plant of the Cowell Portland Cement Co., Cowell, Cal., since 1921 has been made general manager. He succeeds WILLIAM H. GEORGE, who had been general manager for the past quarter century.

HAAKON PAULSON, has become general sales manager for the Besser Manufacturing Co., Alpena, Mich. In 1926 he joined the Anchor Concrete Machinery Co., then located in Columbus, O. In 1928, when Anchor, Ideal and Universal were all consolidated, he took on this full line, sold and serviced these machines until 1932.

HARRY SCHUMACHER of Chicago has been appointed efficiency engineer and R. A. LYNCH of Ottawa, Ill., mechanical engineer, two newly-created positions in the organization of the Ottawa Silica Co., Ottawa, Ill.

FLOYD EVERETT, former manager of the Rockport Stone Co., Bluffton, O., has sold his interest in the quarry to FRANK WATERS of Columbus Grove, O. He has taken a position as Ohio district manager of the Triangle Engineering Co. of Chicago.

FREDERICK HAZEN will re-open and operate an old magnesium limestone deposit at Bolton, Mass., near Boston, it is reported.

E. M. HAMMOND, vice-president of the Gravel Products Corp., Buffalo, N. Y., has been made president and general manager.

G. A. LAWNICZAK has been appointed superintendent of the LaSalle, Ill., plant of the Alpha Portland Cement Co. succeeding G. LUNDBERG, who retired. Formerly, Mr. Lawniczak was superintendent of the Bellevue, Mich., plant.

C. L. BAYLOR has been placed in charge of safety and welfare work of the Louisville Cement Co., Speed, Ind.

H. A. Johann of the Frog, Switch & Mfg. Co., St. Louis, Mo., who was elected chairman of the manufacturers' division and member of the board of directors of the National Crushed Stone Assn. at its convention at Cincinnati in January.

A. F. SERSANOUS, secretary-treasurer of the Loggers & Contractors Machinery Co., Portland, Ore., was elected president of the Associated Equipment Distributors of America at the annual meeting held at Cleveland, O., recently.

MARSHALL E. JOST who has been sales engineer in the Chicago office of Equipment Corp. of America, has been transferred and is now district manager of the Philadelphia office.

G. J. HAWKEY of the Cleveland Duplex Machinery Co., Inc., Penton Bldg., Cleveland, Ohio, has recently been appointed to handle the sale of all products of the Audubon Wire Cloth Corp. in the Cleveland district.

FRED BRADLEY, Rogers City, Mich., former official of the Michigan Limestone & Chemical Co., has announced his candidacy for the Republican nomination for Congress from his district.

HARVEY EVEREST has purchased the interest of A. E. PERRY in the Concho Sand & Gravel Co., Oklahoma City, Okla., and will be active in the management of the concern along with the remaining owner-partner, MOORE C. HESS.

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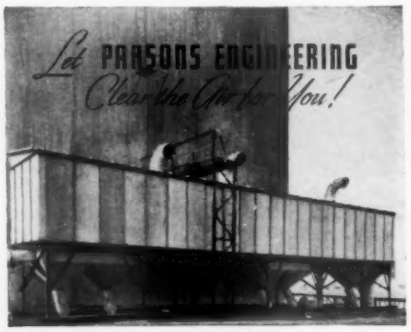

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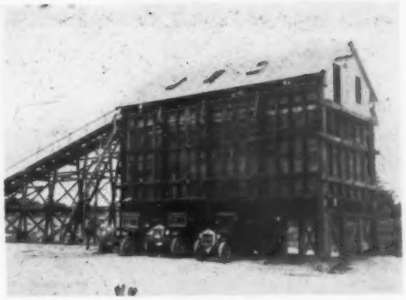

Built last summer, the plant of the Rhode Island Sand & Gravel Co. at Hillsgrove, R. I., is illustrated above. Equipment was supplied largely by the New England Road Machinery Co.

C. BENJAMIN CONDON, 51, secretary and general manager of the Hawkeye Portland Cement Co., Des Moines, Ia., died suddenly Jan. 26 at Des Moines. Death was said to be due to heart disease.

JAMES P. DOIG, 57, assistant secretary of the Edison Cement Co., died Feb. 2 of heart attack on a train from New York City while he and his wife were returning to their home at East Orange, N. J. Besides serving as an official of the Edison Co., Mr. Doig also was secretary-treasurer of the E. K. Medical Gas Co., another subsidiary of Thomas A. Edison Industries of West Orange.

GEORGE B. GROFF, superintendent of the municipal stone quarry at Jefferson City, Mo., passed away Feb. 5 at his home in that place. He was 63 years old and a native Missourian.

WALTER BLACKBURN, 36, shovel operator at the Richards Spur quarry of the Dolese Bros. Co. near Lawton, Okla., met his death recently when the dipper stick of an excavator fell. He had been employed by the Dolese Bros. Co. for 12 years.

CHARLES W. STONE, 63, consulting engineer of the General Electric Co., died at his home in Schenectady, N. Y., on Feb. 3 after an illness which confined him to bed for nine weeks. Death was caused by heart trouble.

MARK A. CALLAHAN, founder and president of the sand-and-gravel company bearing his name, died Jan. 23 at Cleveland, O. He was 79 years old.

J. A. BLANKENSHIP, general manager of the Colonial Supply Co., Inc., sand-and-gravel producer of Louisville, Ky., passed away a short time ago.

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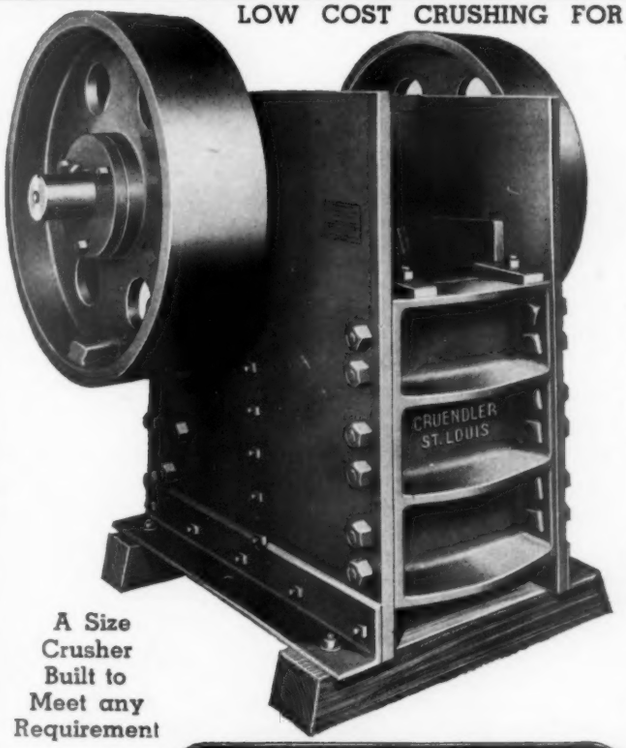

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Foreign Developments

Resumé of Properties Of Ferrari Cements

The type of cements identified with the name of the author (Ferrari) is characterized by the fact that it contains alumina and iron oxide in the ratio of their equivalent weights·

$$\frac{Al_2O_3}{Fe_2O_3} = \frac{102.2}{159.0} = 0.64,$$

that is, the inverse of that in which these two constituents occur in Portland cement.

The author, having observed that the resistance of the Portlands to the action of sulfate waters increased as the modulus of the fluxes diminished, and that this resistance attained its maximum for a modulus of 0.65, concluded therefrom that the cement containing alumina and iron oxide in the ratio of their equivalent weights should be free from aluminates and from ferrites of lime and should consequently contain ternary compounds resistant to the action of the sulfates.

For many years this cement, which its inventor advocated as capable of replacing Portland in all its applications, was considered as a Portland less rich in tricalcium aluminate than the ordinary Portlands and containing a considerable, perhaps a dangerous, proportion of ferrites. Manufacture, covered in most countries by patents, had to be postponed.

More recently, the discovery by W. C. Hansen, L. T. Brownmiller and R. H. Bogue of tricalcium alumio-ferrite established that the celite of Ferrari cement is composed only of Al_2O_3. Fe_2O_3.4CaO, and proved, as the author had stated, the absence of aluminates and ferrites of lime in the cement in question.

Since then, investigations and tests conducted on this cement by numerous students in various countries have verified its truly remarkable resistance to the action of sea water and of aggressive waters even at a quite high concentration, its reduced heat of hydration, its low shrinkage, etc.

The raw mixes producing Ferrari cement can be calculated thus by means of the limit formula:

$CaO = 2.8\ SiO_2 + 1.65\ Al_2O_3 + 0.35\ Fe_2O_3$, with a ratio of the fluxes equal to 0.64.

The principal advantages of Ferrari cement (particularly, of low silica modulus) are the following: (1) Easier burning than that of ordinary Portlands, and with a lower consumption of fuel; (2) harder clinker, but more brittle and consequently easy to grind; (3) very regular set, the quantity of gauging water necessary being 15 to 20 per cent. lower than that required by the Portlands; (4) out of various cements of comparable fineness and stable in the LeChatelier test, the highest strengths were obtained with Ferrari cements of low silica modulus; (5) Ferrari cements show a shrinkage always much less than that of the ordinary Portlands; (6) the elasticity of the Ferrari cements develops more favorably than that of the other cements, during the hardening; (7) the resistance of the Ferrari cements to the action of aggressive waters and sea water is incomparably higher than that of ordinary cements containing an average or high proportion of calcium aluminate; (8) the net cost of their manufacture is advantageous, for they can be prepared from the raw materials for Portland to which are added small proportions of iron oxide, generally in the form of pyrites cinders; their burning is easy and, because of their very high hydraulic power they do not require an extreme fineness of grinding; (9) Ferrari cement, not containing aluminate of lime, forms the truly efficient base for preparation of mixed cements with pozzuolana or blast-furnace slag, the great importance of which for marine operations has been recognized for many years.

The author believes that for these reasons Ferrari cement will take in modern industry the place which it merits.—Dr. F. Ferrari, reprint from *Il Cemento Armato, Le Industrie del Cemento,* No. 5, May, 1937: *Revue des Materiaux de Construction et de Travaux Publics,* November, 1937, No. 33, p. 238.

Studies Constitution Of Chilled Slag

In a study of the constitution of the blast-furnace slags which are used for the production of slag cements, the author rejects both the pozzuolanic and the zeolitic theories. According to his opinion slag is partially a glass insofar as the chilling of the molten slag takes place only at the surface, while the interior of the particles cools less rapidly than is generally believed. Sudden cooling is necessary in order to prevent reactions in the solid phase, such as the conversion of the β–$2CaO.SiO_2$ into the non-hydraulic γ–modification. However, the quenching does not prevent the production, at least partially, of an equilibrium at the moment of hardening. Consequently, dicalcium silicate and gehlenite can be expected in quenched blast-furnace slag.

The hydraulic properties of slags are explained by β–$2CaO.SiO_2$, since this sets upon simple hydration, slowly of course in the cold state but very fast in the autoclave. If β–$2CaO.SiO_2$ or cooled slag is heated again to 800 deg. C. the hydraulic properties are completely destroyed, since conversion to the γ–modification takes place.

The influence of the addition to calcium sulphate and of lime to the slag can be ascribed to their action on the second constituent, gehlenite. There is actually a parallel between the two reactions, but with the difference that the slag can fix the sulphate without addition of lime on account of the liberation of calcium sulphide, which provides the necessary alkalin-

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ity. The dynamics of this fixation is not yet completely clear. The author conjectures that the calcium sulphate causes a "mobilizing" of the aluminate out of the gehlenite, and the formation of sulpho-aluminate. Candlot's sulpho-aluminate is not recognizable, but aluminate can be extracted with boiling water until the slag reacts negatively. In that case, however, not all the sulphate is fixed as sulpho-aluminate. There is rather a further double compound of the type of the sulpho-silicate.

Investigation of the physico-chemical properties of slag before the quenching seems to the author to be particularly important for the future. The initial temperature is probably responsible for the greater or lesser reactivity of slags, because the molecular condition of the constituents of the melt depend on the temperature.—*Verre et Silicates Industriels*, Vol. 8, 1937, 53-56, 61-64, 73-75; *Zement* 26:705, Oct. 28, 1937.

Insulating Course For Shaft-Kiln Walls

American experiences have shown the practicability of insulating courses even in the lining of rotary kilns, where such factors as vibration create considerable technical difficulties. Not even these difficulties attend the construction of courses of insulating materials, such as tamped kieselguhr and burned kieselguhr bricks, in the walls of shaft kilns, or various types of brick and ceramic kilns. Some illustrative computations show the method of computing the practicable thickness with consideration of capital costs, thermal economies, etc. Such courses have such further advantages as economy in masonry work, reduction of heat stresses in the kiln walls, and economy in the foundation costs. —Felix Vogeler in *Tonindustrie-Zeitung* 62:87-89, January 27, 1938.

TRADE NOTES

The North Carolina highway department, Raleigh, N. C., recently took delivery on 138 units of Crescent concrete-pipe forms for the production of tongue-and-groove pipe of from 12 to 36 in. in diameter. The equipment was made and sold by the R. & L. Concrete Machinery Co., Kendallville, Ind.

Hendrick Manufacturing Co., makers of perforated metals and other products, has announced a change in the location of the Pittsburgh office. The new address is Room 744, Gulf Bldg.

The Union Wire Rope Corp., has announced the appointment of W. W. Cochrane as representative for their commercial wire rope department in the Milwaukee territory. Mr. Cochrane is located in the Underwriters Exchange Building, 828 N. Broadway.

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THE once necessary evil of using *heavier* pipe than was needed in order to obtain the required *strength*, was wiped out when Taylor Forge pioneered spiral pipe.

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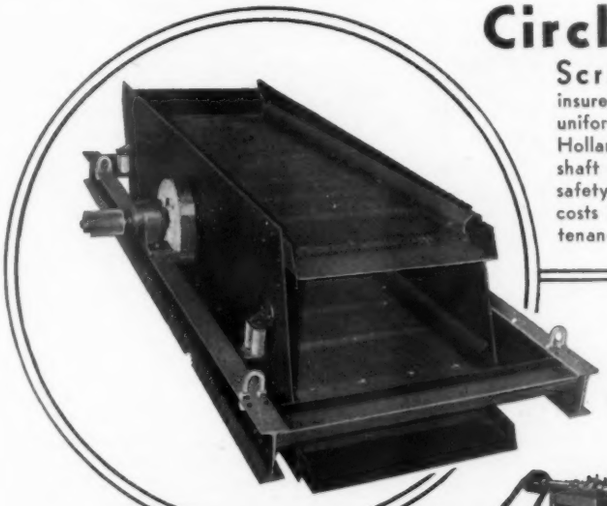

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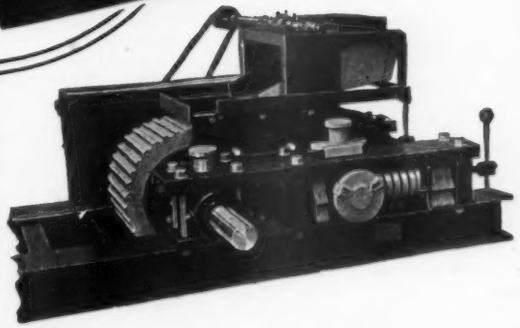

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Traffic News Digest

Legislation

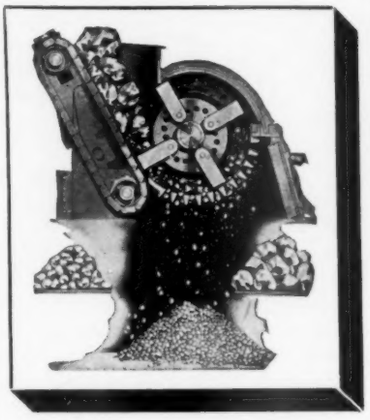
Train-Length-Limit Bill—Hearings on the the bill to limit the length of freight trains to 70 cars were begun before the House committee on interstate and foreign commerce the latter part of January. This bill passed the Senate at the previous session. J. A. Farquharson, national legislative representative of the Brotherhood of Railroad Trainmen appeared in favor of the bill offering testimony to show that this legislation was necessary as a safety measure and to call the attention of the committee to the propaganda against the bill. In answer to a question asked by one of the representatives as to whether shorter trains, resulting in more trains would not result in more grade crossing accidents, the witness took the position that an increase in business would result in more trains and that the carriers would put more trains on without regard to grade crossing accidents. Other witnesses appeared to testify as to jolts and injuries caused by riding on the rear ends of long freight trains. Representative Wolverton of New Jersey referred to the situation in Arizona where a 70-car limit law was in effect, where records showed there were more accidents than in Nevada where the law was not in effect, on the lines of the Southern Pacific. Mr. Farquharson had no explanation to make except that the railroads might not have kept accurate records. J. C. Fort, general solicitor of the Association of American Railroads, appeared against the bill. His testimony concerned the effect on safety, on the cost of operation of railroads and on railroad service to the public. He called attention to the fact that the Railway Labor Executive Association representing 20 of the 21 so-called railroad labor organizations but not including the Brotherhood of Railroad Trainmen had not endorsed the bill. Mr. Fort also stated that the train and train service employees constituted about 20 per cent. of the entire group of railroad employees so that this could not be called a railroad labor bill and that it finds no support whatever from any source except that part of railway labor to which he had referred. His testimony included statistics showing that 42½ per cent. of the traffic of the country was now carried in trains of more than 70 cars and during an eight-year period from 1923 to 1930 approximately $7,000,000,000 was spent by the railroads in improvement for their facilities and equipment and that from 1933 to 1937 the average length of freight trains was increased from 39.9 cars to 47.2 cars or 18 per cent. and that the average speed had been increased 48 per cent. Mr. Fort said that passage of this bill would make modern operating methods impossible in the future and estimated that a reduction in the length of freight trains to 70 cars would necessitate 60,000,000 additional freight car miles per year. He quoted from an editorial in *Railroad Trainmen*, a publication edited by Mr. Farquharson, in which it was stated that no class of labor worked under better conditions than railroad trainmen. Commenting on the safety feature he estimated that there would be approximately 245 more deaths per year at grade crossings and other places on railroad rights of way as it had been found that such accidents were almost in the same ratio as the number of trains operating and that the injuries to employees due to sudden starts, stops, lurches and jerks were related not to the length of the trains but to the number of trains. Commenting on the cost of the bill he stated that railway operating expenses would be boosted approximately 100 million dollars a year and that it would cost nearly one-half billion dollars for new equipment and facilities and that these additional costs could only come from higher rates or lower wages and that the results would be car shortages, congestions and embargoes which would undo much of the good which had been accomplished and greatly impair the service. H. C. Booth, general attorney of the Southern Pacific, testified in regard to the effect of operating in Arizona where the 70-car limit was in effect. He stated that the Southern Pacific could have handled the Arizona traffic last year with 3,068 fewer freight trains had it not been for the limit and that the court had found that the additional operating expenses on one main line on the Southern Pacific in Arizona amounted to $400,000.00 per year and on the Santa Fe to $600,000.00 per year. J. J. Sullivan, assistant superintendent of the Southern Pacific at Ogden, Utah, gave some statistics on the safety of train operation showing that comparing 1923 figures with those of 1936 the number of car miles had decreased 13 per cent., the number of train miles 27 per cent. and the number of freight train accidents had been reduced 70 per cent.

Fourth-Section Revision—The Pettingill bill which would eliminate the long- and short-haul clause from the fourth section of the Interstate Commerce act was passed by the House on April 14, 1937 and sent to the Senate. It was there referred to the Committee on Interstate Commerce. Senator Wheeler is chairman of this Committee and is opposed to the bill. In answer to many requests for hearings the Committee set February 23 as the date on which hearings would be held. Arguments for and against the bill were published in the PIT AND QUARRY at the time the bill was before the House of Representatives.

Recent I. C. C. Decisions

Lime—In response to fourth section application No. 16,978 carriers have been granted authority to establish and maintain rates on lime from Kenova, W. Va., to destinations in Kentucky without observing the long- and short-haul clause of section 4. This will enable the applicants to establish rates over all lines or routes from Kenova to the destination territory mentioned using the lowest rates that may be constructed over any line on record on the basis of the southern lime scale and to maintain higher rates based on the general scale at intermediate points. I. C. C. F. S. O. No. 13,029 Lime from Kenova, W. Va., to points in Kentucky.

Sand—The rates on sand in open top cars for single lime hauls from Phalanx and Warwick, O. to destinations in western Pennsylvania have been found unreasonable and unduly prejudicial to the extent they may exceed rates made under the West-Penn single line scale prescribed in Penn Sand & Gravel Producers Association v. B. & O. in 104 I. C. C. 717, based on single line distances. To this scale may be added the increased rates granted in General Commodity Rate Increases 1937, published in 223 I. C. C. 657. New rates for the future are to be made effective not later than May 6. The joint rates from Phalanx and Warwick, O. and all rates from Geauga Lake and Dundee, O. to destinations in west-



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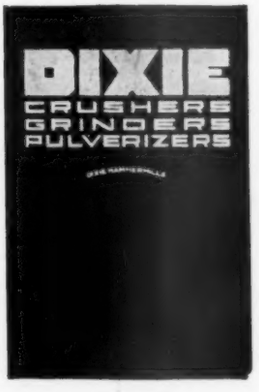

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ern Pennsylvania were found not unreasonable nor otherwise unlawful. I. C. C. Docket No. 27,602, Industrial Silica Corp. *vs.* B. & O. *et al.*

New Complaints Filed

Coated Stone—A complaint in which a barge line alleges refusals of defendants to join with the complainant in the establishment of joint through routes and joint barge-rail rates equal in amounts to those maintained by all-rail dividing such rates on the all-rail divisions and applying appropriate rules, regulations and practices in connection therewith on bituminous rock and coated stone from Big Clifty, Black Rock, Bowling Green, Garfield, Leitchfield, Rockport and Summit, Ky., to destinations in C. F. A., I. F. A., Trunk Line Assn. and New England territories and to destinations west of the Mississippi River in violation of section 500 of the transportation act and sections 1, 3, 6 and 15 of the Interstate Commerce Act has been filed by T. J. McLaughlin, 1010 Earle Bldg., Washington, D. C. Complainant asks for rates and divisions on bituminous rock and coated stone when moving by barge-rail routes originating at Kyrock or Drac, Ky., via water to Evansville, Ind. and via rail beyond; such rates and divisions to be equal in amount as accruing to all rail routes from the other origin points in Kentucky, mentioned, published in Pope's No. 206-D I. C. C. No. 53, and supplements thereto. I. C. C. Docket No. 27,956 Chicago, Ohio & Mississippi Transit Co., Henderson, Ky., *v.* A. & B. B. *et al.*

MOTOR-ACT VIOLATIONS—Shippers have been so accustomed to special rates for truck shipments that it is difficult for some to understand that there is a penalty attached to soliciting or accepting rebates from trucking companies or for the use of any device by which truck transportation is secured at rates lower than those published in lawfully filed tariffs. During the past few weeks a number of cases have been tried in the courts and severe fines have been assessed. The law is just as strict in regard to the observance of truck rates as it is on railroad rates and any shipper who accepts a rebate from a truck company is liable to a fine and imprisonment.

Whiting—A number of complaints covering the rates on whiting have been filed by George A. Duffy, 491 Borse Bldg., Philadelphia, Pa., which have been accepted by the Commission as sub numbers to docket No. 27,921. Previous complaints were abstracted in PIT AND QUARRY last month on page 84. All these complaints are filed under section 1 requesting new rates and reparation and all are against Pennsylvania-Reading Seashore lines *et al.* Sub No. 3 covers rates from Camden, N. J. to Allentown, Pa., for Allentown Paint Co., Inc., Allentown, Pa. Sub No. 4 covers rates from Camden, N. J. to Cincinnati, Ohio for Charles Moser Co., Inc., Cincinnati, Ohio. Sub No. 5 covers rates from Camden, N. J. to Dayton, Ohio for Dix-Pontius Co., Inc., Dayton, Ohio. Sub No. 6 covers rates from Camden, N. J. to Detroit and Chicago, Ill., for Plastic Producers Co., Inc., Detroit, Mich. Sub No. 7 covers rates from Camden, N. J. to Baltimore, Md., for Thomas Mfg. Co., Inc., Baltimore, Md. Sub No. 8 covers rates from Camden, N. J. to Detroit, Mich. for Truscon Laboratories, Inc., Detroit, Mich. Sub No. 9 covers rates from Camden, N. J. to Chicago Heights, Ill., for Weber Costello Co., Inc., Chicago Heights, Ill.

(Continued on page 105)

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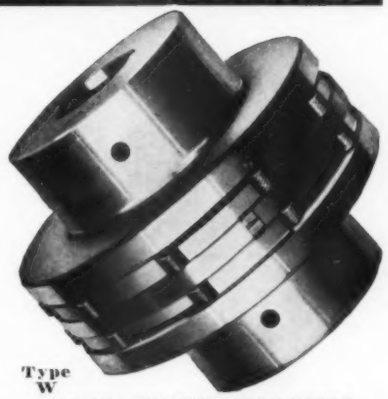

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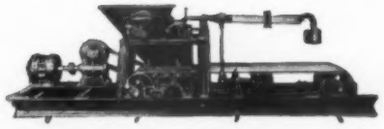

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Occupational Diseases and the Law

Nature of "Disease"

In *Matter of Goldberg*, decided on January 11, 1938, by the New York Court of Appeals, the court points out the essential differences between occupational diseases and other diseases contracted during employment, and accidental injuries arising out of employment.

An occupational disease is held to be one which results from the nature of the employment, and by nature is meant, not those conditions brought about by the failure of the employer to furnish a safe place to work, but conditions to which all employees of a class are subject, and which produce the disease as a natural incident of a particular occupation, and attach to it as a hazard which distinguishes it from the usual run of occupations and is in excess of the hazard attending employment in general.

In the case of a theater cashier with an injury to her limbs resulting from the alternate heat and cold in the booth in which she sold tickets, her occupation was that of handling cash and theater tickets. This work in and of itself could not have caused the leg injury or disease. The "disease" was caused not by the nature of her employment, but by failure of her employer to furnish her with a proper and safe place to work. An award under the Workmen's Compensation Act cannot be sustained on that ground.

In this case, however, compensation was justified by reason of an accidental injury within the scope of the Act; on her way to see a doctor, at the direction of her employer, and as a result of the weakened condition of her legs, she fell. The resulting injury is held to be compensable as an accidental injury arising out of and in the course of her employment.

Accidental Injury

Under the Texas Workmen's Compensation Act an occupational disease, as a natural hazard of the employment, rather than an injury, is not compensable. In *Travelers Insurance Co. v. Burden*, however, decided by the U. S. Circuit Court of Appeals, Fifth Circuit, on December 28, 1937, the court sustains an award of compensation on account of lead poisoning where, although more or less lead-impregnated dust or fine metal filings was usually floating in the air, the poisoning was found to be connected with an accident whereby an abnormal quantity of the dust was blown into the employee's face. In a case of this sort, the 30 days within which notice of injury is required by the Texas law to be given to the employer runs from the time the fact of injury is, or reasonably should be, apparent, rather than from the time of the accident.

Washington Act

Chap. 212, Washington Laws of 1937, added a new section to the Washington Workmen's Compensation Act providing for compensation for disabilities resulting from certain occupational diseases. The Department of Labor and Industries issued a notice to all employers, containing the following provision: "That because of the possibility of these occupational diseases being incurred in all types of employment, it will be necessary for you to pay in to this department each and every month two mills for every hour you have someone employed in duties subject to the Workmen's Compensation Act (one mill is to be collected by you from your employees and one mill is to be paid by you as an employer)." In the case of *Polson Logging Co. v. Kelly et al.*, decided recently, the Superior Court for Thurston County holds that this Act as construed by the Department and applied to the plaintiff is unconstitutional and void.

Since Chap. 212 is an amendment to the Workmen's Compensation Act, the court holds that it must be considered in connection with other provisions of that Act. Sec. 7676, Remington's Revised Statutes, determines how the burden of cost of industrial accidents shall be distributed, so that each class of employment will bear its share of the cost of injuries occurring in that class. The occupational diseases act levies an assessment upon all industry, regardless of class and regardless of the various hazards of industry, which the court holds to render it in violation of the equal protection and due process clauses of the constitution.

It is also held that neither the original act nor this amendment authorizes the supervisor to levy assessments without classification, and that no hearing was held by the Department for determining what occupations might produce occupational diseases, or whether or not plaintiff's occupation produced any of the occupational diseases covered by the act. The evidence clearly shows that the plaintiff's operations do not produce any such diseases as are defined by or within the meaning and contemplation of the Act.

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Capacity	Model
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½ yd.	30
⅝ yd.	38
¾ yd.	45
⅞ yd.	52
1 yd.	62
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OCEOLA STONE CO., Oceola, O. Incorporators: Matt Otto, Virgil Horn, Chester Reiff, Walter Gearhart and H. E. George.

ROANOKE READY MIX CONCRETE CORP., Roanoke, Va. Maximum capital, $50,000. A. V. Criss, president, Parkersburg, W. Va. Charles D. Fox, Jr., Roanoke, attorney.

ATLANTIC LIME CORP., Taylorsville, S. C. Capital stock, $510,000. Incorporators: J. Innis McCants, 21 King St., and R. W. Hanckel.

THE JEFFERSON CITY SAND CO., Jefferson City, Mo. Capital stock, $30,899. Incorporators: Joseph Wallau and George F. Wallau.

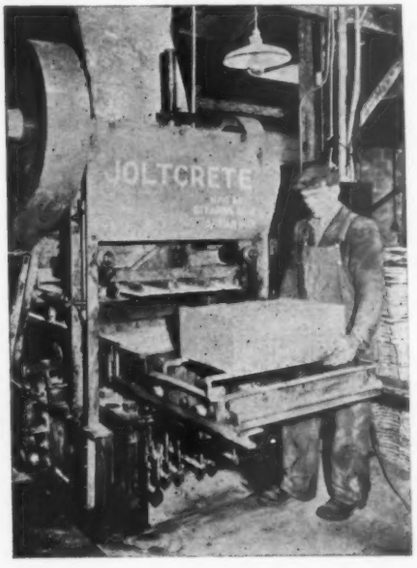
New Machinery and Supplies

● Vibrated Units

The most recent development in the production of vibrated concrete is in the concrete-products field and is embodied in the Stearns Joltcrete machine which is now introduced after a year's successful performance in commercial products plants. The machine was on display and attracted much attention at the Chicago concrete show.

The process, which seems to hold large promise for better building units, produced at costs as low or lower than now common in the field, puts into practice the theory of limited amplitude vibration. Its success rests upon the unusual number of shocks given the concrete (7200 per min.) and the extremely short travel of the mold box under vibration (3/64 in.).

The machine requires no operator, as the operation of each cycle is entirely automatic.



The Vibrated-unit machine as installed.

One of the off-bearers taking the finished product from the machine simply touches a button which starts a new operating cycle. The machine stops automatically at the end of each cycle for the introduction of new pallets to the mold box.

When an operating cycle starts, the blocks made in the previous cycle are out in front of the machine on a carriage. The machine feeds the mold box a surplus of material, starts vibration automatically. After a proper, predetermined period of vibration the machine strikes off automatically, drops a close fitting pressure head onto the tops of the blocks, which remains there for a predetermined and adjustable period until the required density is reached, whereupon vibration automatically ceases, and the blocks and pressure head are striped up automatically and the machine stops. The off-bearers having emptied the carrier of blocks previously made, the carrier is slipped under the new batch of blocks and is pulled out. One off-bearer places pallets in the mold box, presses a button and a new cycle starts.

The mold box vibrates in a vertical plane, within a 3/64-in. limit, making 3600 trips each way per min., or subjecting the concrete to 7200 distinct shocks. In this process the aggregates are thoroughly rubbed against one another, resulting in a re-mixing action that coats each particle with a thin film of cement. Another effect of the vibration is to permit each particle to find its most natural or "best fitting" position. These two factors give the unit great strength and density. The process permits use of a mix with a low water-cement ratio and of aggregates of a desirable fineness modulus. The process permits the manufacturer to vary the treatment given different kinds of aggregate and different shapes of units, thicknesses of webs, etc.

Units made by this process are said to have remarkable uniformity of texture. In the case of light aggregates, there is no breakage of particles during molding and the units have extremely high insulation and acoustical values.

In normal operation, the machine performs through two to three complete cycles per min. Each cycle produces three 8 by 8 by 16-in. blocks or two 8 by 12 by 16-in. blocks or 20 standard bricks or any combination of units that can be accommodated in a mold box 12 in. high and 18 by 24 in. in area. Stearns Manufacturing Co., Adrian, Mich., maker of the machine, reports that cost records on commercial operations indicated that unit cost of production compares favorably with costs achieved by older methods of manufacture and that the product easily commands a premium price on the market.

● Mixer-Agitator

The T. L. Smith Co., concrete-mixer manufacturer since 1900, announces a new type of truck mixer and agitator, revolutionary in design. It has been christened the Smith-Mobile. Although entirely new in principle of operation, the Smith-Mobile is said to incorporate all the desirable basic features of the conventional truck mixer plus many new refinements that make for greater speed and efficiency in concrete delivery.

The unique, duo-cone mixing drum is equipped with a combination charging chute and sealing door. There is no hatch to open or close. The drum rotates during the charging operation and mixing starts the instant the materials enter the drum, resulting in a greater capacity for a given drum volume.

The company claims the new drum design insures a better mix. The batch is dry mixed and shrunk as it enters the drum. Big T-shaped spiral blades are said to produce a positive "end-to-end" movement of the aggregates. Water is pumped into the drum at 50-lb. pressure, and is introduced through the feed opening (instead of through the support bearing at the opposite end). A special nozzle is used to secure a spray effect, thereby effecting a faster and more uniform distribu-

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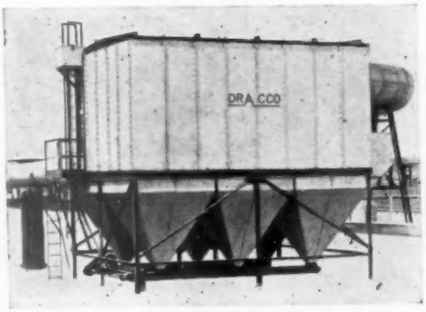
Write for Bulletin No. 302



The DRACCO MULTI-BAG Dust Collector is unusually efficient in controlling Dust from grinding and other operations in processing cement, lime, silica, and many other granular materials. It has high Dust collecting efficiency,—the automatic shaking mechanism keeps all of the filter cloth area clean so it is available for filtering at all times. The DRACCO MULTI-BAG Dust Collector is simple in design and has a low INITIAL cost — a low OPERATING cost — a low MAINTENANCE cost. DRACCO Engineers have over 20 years experience collecting Dust of every description—this practical experience is available to you in solving your Dust problems. Why not write?

DRACCO Dust Collectors are Maintained on the CLEAN AIR SIDE

Write for Bulletin No. 302

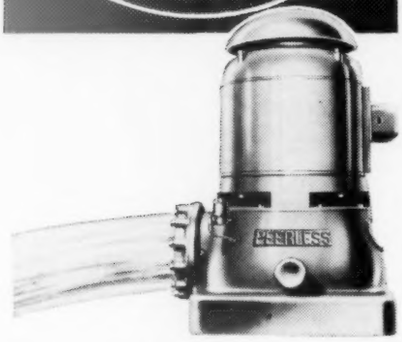
● DRACCO CORPORATION ●

4077 E. 116th St., Cleveland, Ohio • New York Office, 130 W. 42nd St.

PNEUMATIC CONVEYORS • DUST COLLECTORS

LOOK FOR THIS SEAL

PEERLESS PUMPS



The name that stands for leadership in the deep well pumping field

PEERLESS PUMPS

FOOD MACHINERY CORPORATION

300 Walnut Ave., Massillon, Ohio
Los Angeles, California San Jose, California

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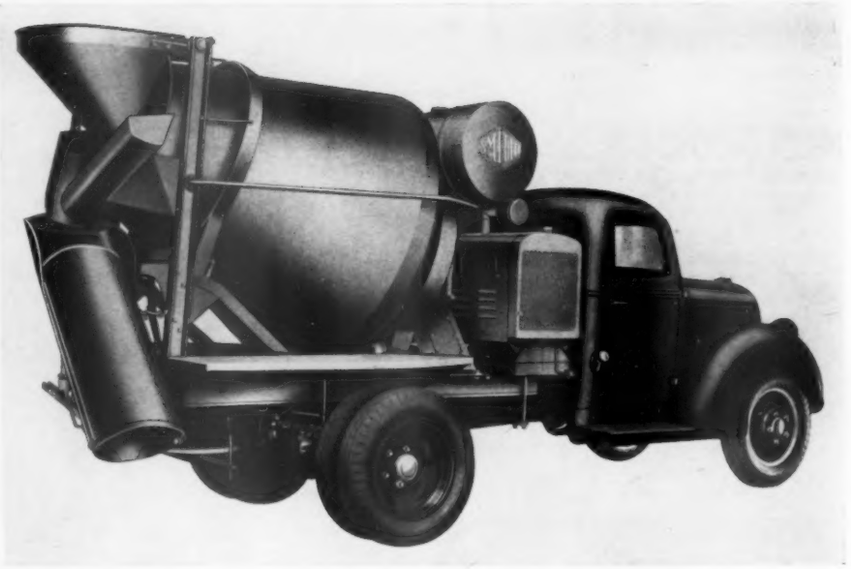
LOW BELT COST PER TON CONVEYED . . .

that's what you're looking for in conveyor belts . . . and that's what you'll find in Cincinnati Conveyor Belts.

The Cincinnati Rubber Mfg. Co.
Cincinnati, Ohio

CINCINNATI

CONVEYOR & ELEVATOR BELTS



Improved truck-mixer and agitator.

tion of water in the batch. The nozzle is located in the top section of the drum where it does not come in contact with the aggregates.

Other Smith-Mobile features include: high discharge without hoist, distributing spout carried on pivot bracket, load carried in front of rear axle, accurately calibrated two-compartment water tank, elimination of water bells in drum, and direct-driven rotary turbine pump included as standard equipment.

The Smith-Mobile will be available in 1½, 2, 3, and 4 cu. yd. truck-mixer sizes with corresponding 2, 3, 4½ and 6 cu. yd. agitator sizes.

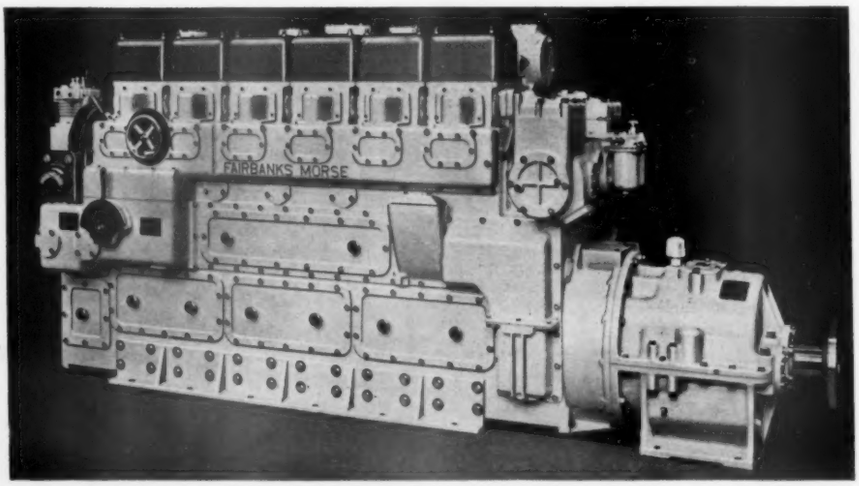
● Diesel-Gas Engine

Fairbanks, Morse & Co. has announced a series of four-cycle, vertical, convertible Diesel and gas engines. This new Model 36-A-8 size fills a definite need for sturdy, medium-speed engines in the 200- to 300-hp. range. Built in both 6- and 8-cyl. combinations, with 8-in. bore and 10½-in. stroke, they develop 35 hp. per cylinder at 720 r.p.m. Smaller sizes of Model 36-A Diesel are available in ratings as low as 8 hp.

Both Diesel and gas engines in the new 8-in. cylinder size are offered for stationary service, and the Diesels are offered for marine propulsion and in complete, unit-built Fairbanks-Morse generating sets as well. The Diesels for marine service are direct-reversible, but can be furnished as non-reversible where such service requires.

The many years of experience of Fairbanks, Morse & Co. in the design and manufacture of Diesel engines for stationary, portable and marine use provide an excellent background for this Model 36-A-8. Designers were guided by the objectives of reliability and economy in service. The resulting engine is extremely simple, neat in appearance, completely self-contained, sturdy and dependable, with excellent fuel and lubricating oil economy.

"Enbloc" construction is employed, with individual cylinder liners, precision main, connecting-rod and camshaft bearings, and suspended or "underslung" crankshaft. Side cover-plates permit easy accessibility to main and connecting-rod bearings. The design permits double-end drive or power take-off from either end, a distinct advantage in certain types of application.

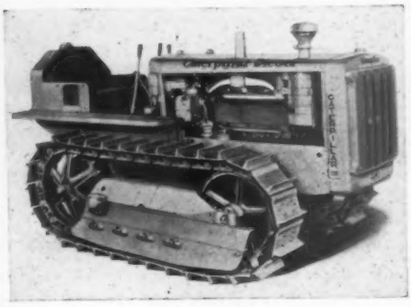


Convertible Diesel and gas engine.

● Diesel Tractor

Reduced operating costs appeals to every owner of quarry equipment and the announcement of the Diesel D2 tractor by Caterpillar Tractor Co. will interest everyone. This 25-hp. tractor will operate under normal load on 1¼ gal. of Diesel fuel an hour. Adding Diesel economy to track-type sure-footed traction, this new model will find many uses in building roads, bulldozing, hauling, and as a handyman around the pit.

The Diesel D2 engine is a 4-cyl., 4-cycle, full Diesel engine incorporating all-weather



New Diesel-powered tractor.

starting through the use of an independent starting engine, an outstanding "Caterpillar" feature. Cooling of the lubricating oil just as the water is cooled is a new development offered for the first time in this model. The self-adjusting seals on final drives, an exclusive "Caterpillar" feature, are included on this model. Oil and fuel filtering are centralized for operating efficiency and convenience. Five forward speeds are provided, a distinct advantage in operations where varying loads and speeds are required. A hand clutch similar to that used on larger models is provided.

This model expands the "Caterpillar" Diesel track-type line to five sizes. Caterpillar Tractor Co. has built track-type tractors for 33 years and Diesel-powered tractors since 1931. All these years of experience are incorporated in the new model. the manufacturer asserts.

● Bin-Level Indicator

The Fuller material-level indicator is a new device employed to control conveyor motors, valve circuits, etc., or give audible or visible warnings when the material reaches or falls below a predetermined level in a bin.

This indicator is positive in operation. It will not make a false indication, in the event of a momentary surge of material in the bin, nor indicate a low level when an aerated pulverized material settles. One or more circuits such as signal, motor control, valve control, or the like, can be opened or closed by the same indicator. The necessity for relays has been eliminated, as the switches are positively held in the desired position when the material is above or below the predetermined level. The switches may be actuated instantly when the material level reaches the indicator or may, by adjustment, be delayed for any interval up to 10 seconds.

The principal working parts of the apparatus are totally enclosed in a dust-tight casing which rests upon the bin cover, a paddle being suspended in the bin at the desired level. The paddle supporting shaft is driven continuously at 1 r.p.m. by a Telechron motor, the motor being supported to turn about the axis of the paddle shaft. When the level of material reaches and arrests ro-

Fine Screening

THEN

THE FOUNTAIN SAND, A
WASHED SAND, GRAVEL AND C

October 13,

Deister Concentrator Company
Fort Wayne, Ind.

Gentlemen:

We have your letter of October 9th relative to our repeat order on Leahy screen.

We are now operating two Leahy screens in connection with producing 1/10" sand. This screen operates very satisfactorily on this fine sand and our repair bills are exceedingly low.

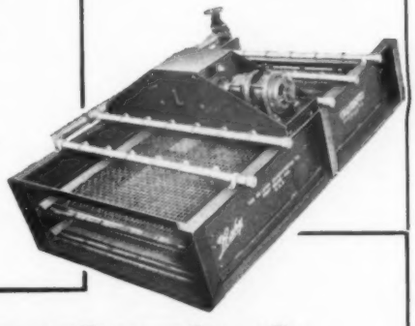
Recently we increased the capacity of our plant and for this reason we installed the same size screen along side the old screen.

We are pleased with the operation of this screen and assure you that if we have any problems in the screening line will take the matter up with you.

Yours very truly,
THE FOUNTAIN SAND AND GRAVEL CO.
By J. P. Bullen
Manager

JAB:L

and Now!



These letters tell a typical story of continuous satisfactory performance, year after year, keeping up with the times in screening efficiency, in trouble-free operation and in low maintenance. You can expect all this, and even more, from today's extra rugged and up-to-the-minute designs of LEAHY Screens. Play safe and get proven dependability by specifying LEAHY equipment for fine screening.

Write for Bulletin

FOUNTAIN SAND AND GRAVEL CO.
MASON AND BUILDER'S SUPPLIES
PUEBLO, COLORADO

June 20th 1936

"And six years later"

Pit and Quarry
538 S. Clark St.
Chicago, Illinois

Gentlemen:

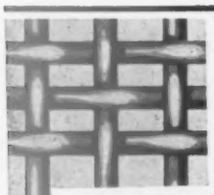
We have your letter of June 18th, relative to the operation of Leahy Screens in our plant.

Leahy Screens have been in operation at our plant for over six years. Two of these screens are used for fine screening, 1/8" opening, and one for screening Gravel thru 1½" opening.

Our operating results are very satisfactory from Leahy Screens. we obtain exceedingly long life from our wire cloth and the costs of repairs are very low.

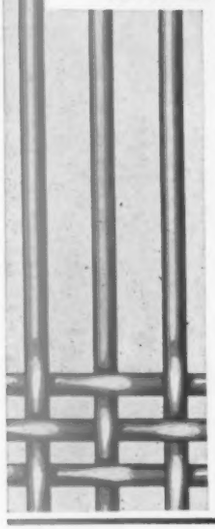
Yours very truly,
THE FOUNTAIN SAND & GRAVEL CO.
By J. P. Bullen
Secretary.

THE ORIGINAL
DEISTER CONCENTRATOR COMPANY
INCORPORATED 1906
911 Glasgow Ave. Fort Wayne, Ind.



NO. 9381
TY-ROD
U. S. PATENT
NO. 2,024,806
TRADE-MARK REG.

TY-ROD
HIGH CAPACITY
SCREEN



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materials

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in All Meshes
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SCREENS

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MACHINERY

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BACON FARREL CRUSHERS

Complete Plants Designed and Equipped.
Screens, Elevators, Conveyors, Quarry, Sand and Gravel Plant Equipment.
Engineering Service.

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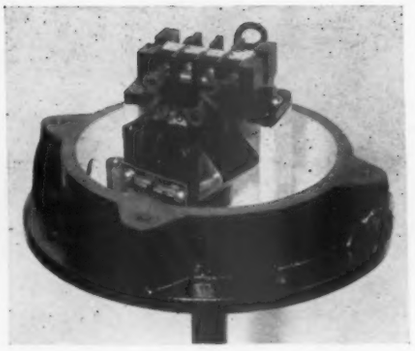
17 John Street New York, N.Y



Open view of the material-level indicator.

tation of the paddle, the motor is driven about the axis of the shaft and actuates the switch mechanism. As the interval between the time when rotation of the paddle is arrested and the switches are actuated is adjustable to provide a lag, the switch mechanism is not affected by a momentary surge of material against the paddle. It is made by the Fuller Co., Catasauqua, Pa.

● New Truck-Mixers

The Ransome Concrete Machinery Co., Dunellen, N. J., has announced it latest creation in truck-mixers. The new design is made in 5 sizes—1, 1½, 2, 3, and 4-cu. yd. capacities.

In keeping with the times they are streamlined in design and operation. All models are built to the same general design varying only in size, dimensions, and power unit requirements. Only a minimum amount of time, it is claimed, is required to attach and detach the unit from the truck chassis.

Through modern methods of welding and the use of high tensile steel the operator is able to take advantage of maximum pay loads. This steel is also anti-corrosive and rust resisting.

The center of gravity has been carefully considered in order to provide proper distribution of load on the truck.

The swivel discharge chute has a 180-deg. swing and is furnished in two sections. The second section may be quickly detached and mounted on the operator's platform where it is firmly held in position by lugs fitting into notches on the platform and spring clips on the other end.

Streamlined truck-mixer at batching plant.

The unit is attached to the truck chassis by clamps, only one hole in each rear side of the frame being required — another very important point.

The water system has been most carefully designed for accuracy and efficiency yet it is extremely simple. The siphon outlet from the main supply tank being always from the center of the tank by movable pipe, measures exact amount of water discharged even though the truck may not be level.

The motor, transmission, reduction gears, etc., are all completely protected against dust, materials, exposure to elements, etc.

The sturdy drum rollers with their supports take any and all end-thrust loads and transmits them directly to the strong frame.

The charging door (easily removed and replaced for quick charging) and the discharge door are circular in shape and made of high tensile steel of the manganese type and controlled by hand wheels. The sealing joints are of the metal-to-metal type eliminating the use of gaskets.

Changes Firm Name

The J. C. Lembo Corp., formerly of Rockville Centre, N. Y., has become distributor for the Jaeger Machine Co., and is now located at Corona, N. Y., on Long Island. The name of the company has been changed to the Jaeger-Lembo Machine Co.

Trade Literature

Crushing, Sizing, Conveying and Storing Equipment for the Production of Stone-Gravel-Sand. 32 p. Rogers Iron Wks. Co., Joplin, Mo.

Rubber-Wheeled Dump Wagons. 6 p. La Plant-Choate Mfg. Co., Cedar Rapids, Ia.

Lincoln-ite Asphalt Plant-Mix. 8 p. Ohio Oil Co., Findlay, O.

Caterpillar RD4 Diesel Tractor. 32 p. Caterpillar Tractor Co., Peoria, Ill.

Southwest Carry Scraper. 4 p. Southwest Welding & Mfg. Co., Alhambra, Cal.

Thornton 4-Rear-Wheel Drive for Chevrolet and Ford Trucks. 8 p. Thornton Tandem Co., Detroit, Mich.

Koehring 603 Excavator. 8 p. Koehring Co., Milwaukee, Wis.

Rockford Over-Center Clutches. 4 p. Rockford Drilling Machine Div., Borg-Warner Corp., Rockford, Ill.

Sullivan Plus Portables (air compressors). 8 p. Sullivan Machinery Co., Michigan City, Ind.

Electric Drive Selector. 12 p. Westinghouse Elc. & Mfg. Co., East Pittsburgh, Pa.

Industrial Friction Materials. 8 p. Johns-Manville Co., New York, N. Y.

Roller Bearing Jaw Crushers. 4 p. *Bronze Bearing Jaw Crushers.* 6 p. Universal Crusher Co., Cedar Rapids, Ia.

Koehring Excavating Equipment, 32 p. Koehring Co., Milwaukee, Wis.

FM-2 Wagon Drill. 6 p. Ingersoll Rand Co., New York, N .Y.

Water-Lubricated Turbine Pumps. 6 p: *Oil-Lubricated Turbine Pumps.* 6 p. Fairbanks-Morse & Co., Chicago, Ill.

Traffic (from page 99)

Wallboard—Schedules proposing to establish a reduced classification rating of class 55 on wallboard in less than carload lots between points in western truck line territory except in southern Kansas as published in supplement 47 to Kipp's I. C. C. A-2710 and supplement 11 to I. C. C. A-2822 Jones' I. C. C. 3042 Curlette's I. C. C. A-543 and Van Ummersen's I. C. C. 319 have been suspended from February 1 until September 1 in I. C. C. I & S Docket No. 4,456.

Traffic News

Rate Increase—Testimony has been received, briefs filed and oral argument heard in the carriers' request for a 15 per cent. increase in freight rates. The matter is now entirely up to the Interstate Commerce Commission and a decision is expected during the early part of March. In the testimony entered in this case comparatively little was said about the railroads securing relief through economy of operation. Charles W. Dow of the comptroller's office of Massachusetts in opposing the increases suggested savings could be effected through asking for legislation that would make railroad taxes more equitable, through changes in tariffs publication that would reduce the cost of printing and mailing tariffs and supplements and through the reduction of off-line agencies and the leasing of unused passenger stations and other railroad facilities to other business. Affidavits were received from some parties who did not enter direct testimony, including several steel companies. Northwestern Ohio lime companies joined in asking that if any increase was granted in lime rates, that it should be made in a flat amount in cents a ton so as to preserve the present rate relations and that any increase granted should apply to the total through rates rather than on each factor where combination rates were used. The Standard Lime & Stone Co., of Baltimore, Md., asked that if increased rates on limestone be found justified that such rates be increased by a flat amount in cents a ton to preserve the present rate relations. Among those appearing for oral argument was A. J. Ribe, representing Southern Sand & Gravel Producers, M. S. Allison, representing Federal Cement Tile Co., and Homer J. Conley representing southwestern quarries. Mr. Conley opposed any increases in the rates on stone from southwestern quarries. Mr. Allison took the position that any increases that were allowed should take into consideration the increases that were put into effect November and December, 1937 so that there would not be a double increase. Mr. Ribe representing Southern Sand & Gravel Producers opposed any increases on those commodities from the south.

U. S. Patent 2,090,563 has been granted the American Manganese Steel Division of The American Brake Shoe & Foundry Co. on the Whisler design rivetless dredge bucket which now makes available a renewable-lip dredge bucket with one-piece bucket rigidity.

This is accomplished by seating and securing the lip so that it is interlocked with the body, actually adding to the strength of the whole assembled unit. As may be seen in the accompanying illustration, semi-circular horns cast integral with the two ends of the lip fit into correspondingly shaped recesses in the body. A flange on the lip fitting down snugly over the hood-rim prevents sideway and lip distortion, and affords a positive locking device and a perfect non-obstructing union between body and lips that is far superior to riveted-lip construction.

Wedge-head bolts are inserted vertically through lugs cast integral with the lip and bucket body. The wedge-shaped bolt heads fit into correspondingly shaped recesses in the lip lugs providing constant tension. The vertical arrangement of bolts and lugs gives a minimum of digging resistance and at the same time places the bolts in a position where they will not be fouled by material and where they are shielded from impact. This allows the quick unbolting and removal of the lips. Tests have shown that even under the severest service abuse no damage to the bolt threads occurs.

The lips, body and links are reinforced wherever the most wear is likely to be encountered. This reinforcing is especially evident where the lips join the body as a result of which considerable wear can take place without weakening the unity of body and lips.

The smooth body interior, the sharp lip cutting edge, and the lip taper combine to provide a quick, easy digging unit that scoops up full loads with a minimum of bucket wear and with a conservation of power. Buckets dump clean as there are no internal obstructions, crevices or ribs to which the material can stick.

A 5-ft. by 12-ft. double-deck low-head vibrating screen with bottom plate as built by Allis-Chalmers Mfg. Co. for use at a government project in the South. It will handle crushed rock having a maximum feed of 7 in. The top deck has 3¾-in. square openings and the bottom deck 1⅝-in. square openings. The operating mechanism is driven by a 15-hp. motor through Texrope drive.

Rivetless, renewable-lip dredge bucket.

CUT

YOUR PIPE PERFORMANCE COSTS

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1237 EAST NINETY-SECOND ST.
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SECO VIBRATING SCREENS

SCREEN EQUIPMENT CO.
9 LAFAYETTE AVE., BUFFALO, N. Y.

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified.

Index to Advertisers on Page 128

Aggregate-Bituminizing Plants
Hetherington & Berner, Inc.
*Warren Brothers Roads Co.

Agitating Ladders (Dredge)
*Eagle Iron Works

Agitators, Thickeners and Slurry Mixers
*Manitowoc Engineering Works
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Air Compressors (Portable)
*Chicago Pneumatic Tool Co.
Gardner-Denver Co.
*Ingersoll-Rand Co.

Air Compressors (Stationary)
*Chicago Pneumatic Tool Co.
Fuller Company
Gardner-Denver Co.
*Ingersoll-Rand Co.

Air Filters
*Blaw-Knox Co.
*Dracco Corporation
*Parsons Engineering Corp.
*Schneible Co., Claude B.
*Sly Manufacturing Co., W. W.
*Western Precipitation Co.

Air Pumps
Gardner-Denver Co.
*Ingersoll-Rand Co.

Air Separators
Babcock & Wilcox Co.
Bradley Pulverizer Co.
*Gruendler Crusher & Pulverizer Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Sly Manufacturing Co., W. W.
Sturtevant Mill Co.
*Williams Patent Crusher & Pulverizer Co.

Alloys (Steel)
Frog Switch & Mfg. Co.
Manganese Steel Forge Co.
Stulz-Sickles Co.

Ash and Refuse-Handling Equipment
Allen-Sherman-Hoff Co.
Bartlett & Snow Co., C. O.
*Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link Belt Co.
*Robins Conveying Belt Co.

Asphalt Mixing Plants
Hetherington & Berner, Inc.
*Warren Brothers Roads Co.

Automatic Feeders
Bartlett & Snow Co., C. O.
Bradley Pulverizer Co.
*Fuller Company.
*Jeffrey Mfg. Co.
*Link Belt Co.
Schaffer Poidometer Co.

Automatic Weighers
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Fuller Company
*Jaeger Machine Co.
Schaffer Poidometer Co.

Axle (Dual Rear Axle Drive For Trucks)
Thornton-Tandem Co.

Backfillers
*Austin-Western Road Machy. Co.
*Bucyrus-Erie Co.
Continental Roll & Steel Fdry. Co.
General Excavator Co.
*Lima Locomotive Works, Inc.
Marion Steam Shovel Co.

Backfill Tampers
Northwest Engr. Co.

Balls (Grinding)
Babcock & Wilcox Co.
Bartlett & Snow Co., C. O.
Carnegie-Illinois Steel Corp.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Manganese Steel Forge Co.
*Traylor Engr. & Mfg. Co.

Balls (Tube-Mill, etc.)
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
Carnegie-Illinois Steel Corp.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Manganese Steel Forge Co.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Barges (Steel)
*Manitowoc Engineering Works

Bearings (Anti-Friction)
Bartlett & Snow Co., C. O.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Robins Conveying Belt Co.
*Sprout, Waldron & Co.
Timken Roller Bearing Co.

Bearings (Roller)
Timken Roller Bearing Co.

Belt Fasteners
Armstrong-Bray & Co.
Flexible Steel Lacing Co.

Belt Lacings
Armstrong-Bray & Co.
Flexible Steel Lacing Co.

Belting
*Cincinnati Rubber Mfg. Co.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manhattan Rubber Mfg. Co.
Quaker City Rubber Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.
United States Rubber Co.

Belting (Multiple V)
Manhattan Rubber Mfg. Co.

Belts (Fan)
Quaker City Rubber Co.
United States Rubber Co.

Bin Gates
Allen-Sherman-Hoff Co.
Bartlett & Snow Co., C. O.
*Fuller Company.
*Haiss Mfg. Co., Geo.
Heltzel Steel Form & Iron Co.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Bins (Cast Iron)
Allen-Sherman-Hoff Co.

Bins (Steel)
*Austin-Western Road Machy. Co.
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
Heltzel Steel Form & Iron Co.
*Hendrick Mfg. Co.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Pioneer Engineering Works
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.
*Universal Crusher Co.

Blast-Hole Drills (See Drills—Blast-Hole)

Blasting Machines
Atlas Powder Co.

Blasting Supplies
Atlas Powder Co.
*Ensign-Bickford Co.

Block Machines (Concrete)
Blystone Mfg. Co.
Dunn Mfg. Co., W. E.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Block Machines (Power Press, Concrete)
Blystone Mfg. Co.
Dunn Mfg. Co., W. E.
Multiplex Concrete Machinery Co.
R & L Concrete Machinery Co.
Stearns Mfg. Co.

Blocks (Pillow)
*Jeffrey Mfg. Co.

Blocks (Sheave)
Clyde Iron Works, Inc.
Haiss Mfg. Co., Geo.
*Sauerman Bros., Inc.
*Sprout, Waldron & Co.

Blowers
*Sly Mfg. Co., W. W.

Bodies (Cars & Motor Truck)
*Easton Car & Construction Co.

Bodies (Motor Truck, Concrete Mixing)
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
Jaeger Machine Co.

Boilers
Babcock & Wilcox Co.

Boots (Rubber)
United States Rubber Co.

Borings, Core
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Brick Machines (Concrete)
Dunn Mfg. Co., W. E.
R & L Concrete Machinery Co.
Stearns Mfg. Co.

Brick Manufacturing Equipment
Dunn Mfg. Co., W. E.
Stearns Mfg. Co.

Bronze Work (Ornamental)
National Wire Cloth Co.
*Tyler Co., W. S.

Bucket Elevators (See Conveyors and Elevators)

Buckets (Clamshell, Orange-Peel, Etc.)
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
Owen Bucket Co.

Buckets (Dump)
*Dempster Bros., Inc.
*Jaeger Machine Co.

Buckets (Dragline—Cableway)
Bartlett & Snow Co., C. O.
*Bucyrus-Erie Co.
*Link-Belt Co.
*Pioneer Engineering Works
*Sauerman Bros., Inc.

Buckets (Elevator and Conveyor)
Bartlett & Snow Co., C. O.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Pioneer Engineering Works
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Buggies (Dump)
*Easton Car & Construction Co.
*LeTourneau, Inc., R. G.

Bulk-Cement Storage Plants
*Sprout, Waldron & Co.

Bulldozers
*LeTourneau, Inc., R. G.

Burners (Oil)
Babcock & Wilcox Co.

Cableways
Leschen & Sons Rope Co., A.
*Link-Belt Co.
*Sauerman Bros., Inc.

Calcium Chloride
*Calcium Chloride Association

Caps (Blasting)
Atlas Powder Co.

Caps (Blasting, Electric)
Atlas Powder Co.

Capstans (See Winches and Capstans)

Cars (Block, Concrete)
Multiplex Concrete Machinery Co.

Car Dumpers
*Link-Belt Co.

Car Liners (Paper)
Hummel-Foley Corp.

Car Pullers
Bartlett & Snow Co., C. O.
Clyde Iron Works, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Carriers
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Carryalls
*Austin-Western Road Machy. Co.
*Easton Car & Construction Co.
*LeTourneau, Inc., R. G.

Car Wheels — (See Wheels — Car)

Cars (Quarry and Gravel Pit)
*Austin-Western Road Machy. Co.
*Easton Car & Construction Co.

Castings
Babcock & Wilcox Co.
Bartlett & Snow Co., C. O.
*Eagle Iron Works
Frog Switch & Mfg. Co.
Hetherington & Berner, Inc.
Holmes & Bros., Inc., Robt.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Cement Pumps (See Pumps; Air Pumps; Pumps, Cement Slurry; Pumps, Bulk Cement)

Central Concrete Mixing Plants (Comp.)
Bartlett & Snow Co., C. O.
Heltzel Steel Form & Iron Co.
*Jaeger Machine Co.
*Sprout, Waldron & Co.

Chain Attachments
*Jeffrey Mfg. Co.

Chain (Dredge and Shovel)
Manganese Steel Forge Co.

Chain Drives
*Jeffrey Mfg. Co.
*Link-Belt Co.

Chain (Elevating and Conveying)
Bartlett & Snow Co., C. O.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
*Sprout, Waldron & Co.

Chute Lining (Rubber)
Manhattan Rubber Mfg. Co.

Chutes and Chute Liners
Bartlett & Snow Co., C. O.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
*Sprout, Waldron & Co.

Classifiers
Bradley Pulverizer Co.
*Deister Machine Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
*Nordberg Mfg. Co.

Clips (Wire Rope)
Leschen & Sons Rope Co., A.

Clutches
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.

Coal-Pulverizing Equipment
*Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Bartlett & Snow Co., C. O.
Bradley Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Compressors (See Air Compressors)

Concentrators (Slurry)
*Deister Concentrator Co.

* See also information in the 1938 Pit and Quarry HANDBOOK.

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The Best ¾ yd. Quarry shovel you can buy. Figure it by the price per pound of machinery or the cost for moving a ton of stone—any way you please — the Invincible will always "Give you More."

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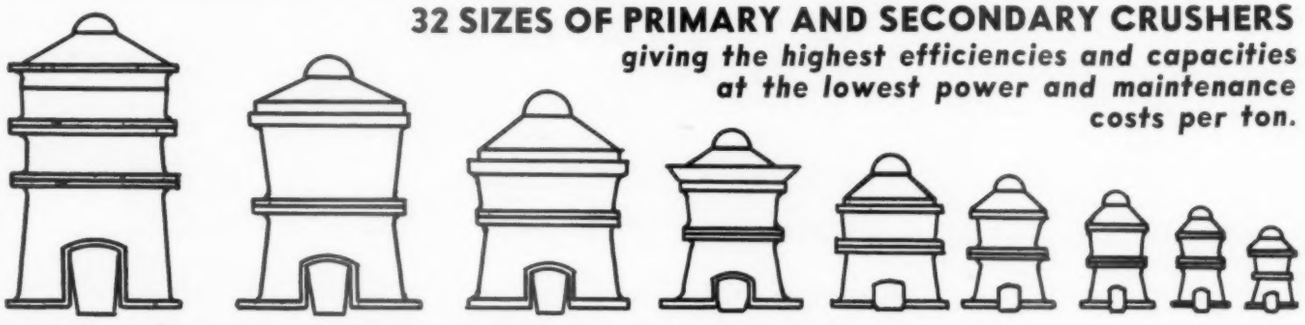

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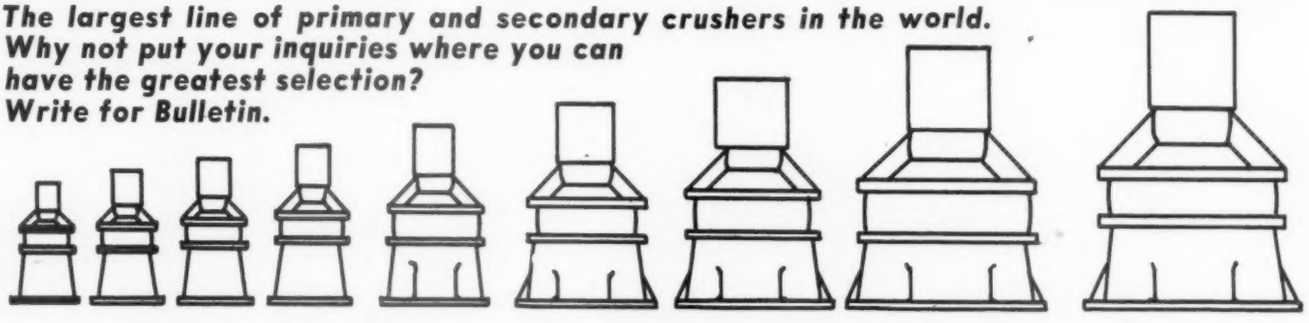

Also a complete line of Jaw, Roll Hammer, and Slugger Roll Crushers.

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2 Park Avenue — New York, N. Y.

Sales Agents in all Principal Cities of the United States.

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Index to Advertisers on Page 128

Concrete Breakers (Air)
*Chicago Pneumatic Tool Co.
Gardner-Denver Co.
*Ingersoll-Rand Co.

Concrete Mixers
*Blaw-Knox Co.
*Jaeger Machine Co.

Condensers
*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.

Cones (Sand-Washing)
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
*Link-Belt Co.
Smith Engr. Works

Conveyor Belting (See Belting)

Conveyor Idlers and Rolls
Bartlett & Snow Co., C. O.
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Conveyors and Elevators
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Bartlett & Snow Co., C. O.
*Dracco Corporation
*Fuller Company
*Gruendler Crusher & Pulverizer Co.
*Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Holmes & Bros., Inc., Robt.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Pioneer Engineering Works
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Universal Crusher Co.

Conveyors (Pneumatic)
*Dracco Corporation
*Fuller Company

Conveyors (Ready-Mixed Concrete)
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Haiss Mfg. Co., Geo.
*Jaeger Machine Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Conveyors (Screw)
*Jeffrey Mfg. Co.

Conveyors (Vibrating)
*Jeffrey Mfg. Co.

Coolers (Clinker)
*Allis-Chalmers Mfg. Co.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Coolers (See Kilns and Coolers—Rotary)

Correcting Basins
*Smidth & Co., F. L.

Couplings (Flexible and Shaft)
Erie Pump & Engine Works
*Huron Industries Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Lovejoy Flexible Coupling Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Couplings (Hose)
*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.

Cranes (Crawler and Locomotive)
*Austin-Western Road Machy. Co.
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
Clyde Iron Works, Inc.
General Excavator Co.
*Lima Locomotive Works
*Link Belt Co.
*Manitowoc Engineering Works
Marion Steam Shovel Co.
Northwest Engr. Co.

Crusher Hammers
Electric Steel Fdry Co.

Crusher Parts
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
Frog Switch & Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.

Crushers (Cone)
*Nordberg Mfg. Co.

Crushers (Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bartlett & Snow Co., C. O.
Bradley Pulverizer Co.
Brooks Equipment & Mfg. Co.
Carnegie-Illinois Steel Corp.
*Dixie Machinery Mfg. Co.
Electric Steel Foundry Co.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Sturtevant Mill Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Jaw and Gyratory)
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
Bacon, Inc., Earle C.
Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
New Holland Machine Co.
*Nordberg Mfg. Co.
*Pioneer Engineering Works
Smith Engr. Works
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.

Crushers (Ring)
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Roll)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bartlett & Snow Co., C. O.
Brooks Equipment & Mfg. Co.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Pioneer Engineering Works
*Robins Conveying Belt Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Rotary)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bartlett & Snow Co., C. O.
New Holland Machine Co.
*Williams Patent Crusher & Pulverizer Co.

Crushing Rolls
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Derricks and Derrick Fittings
Clyde Iron Works, Inc.

Detonators
Atlas Powder Co.

Diaphragms (Rubber)
Quaker City Rubber Co.

Diesel Engines (See Engines—Diesel)

Dipper Parts
Frog Switch & Mfg. Co.

Dippers and Teeth (Power Shovel)
*Bucyrus-Erie Co.
Frog Switch & Mfg. Co.

Doors (Car)
Hummel-Foley Corp.

Dragline Cableway Excavators
*Bucyrus-Erie Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Dragline Excavators
*Austin-Western Road Machy. Co.
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
General Excavator Co.
*Lima Locomotive Works, Inc.
*Link-Belt Co.
*Manitowoc Engineering Works
Marion Steam Shovel Co.
Northwest Engr. Co.

Draglines (Walking)
*Bucyrus-Monighan Co.

Dredge Engines
Clyde Iron Works, Inc.

Dredges
*Bucyrus-Erie Co.
Hetherington & Berner, Inc.
*Morris Machine Works

Drill Bit Reconditioning
*Bucyrus-Erie Co.

Drill Bits
*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.

Drill Sharpening Machinery
Gardner-Denver Co.
*Ingersoll-Rand Co.

Drill Steel
*Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
*Ingersoll-Rand Co.

Drilling Accessories
*Bucyrus-Erie Co.
*Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.
*Ingersoll-Rand Co.
Timken Roller Bearing Co.

Drilling Contractors
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Blast-Hole)
*Bucyrus-Erie Co.
*Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardener-Denver Co.
*Ingersoll-Rand Co.

Drills (Core)
Hoffman Bros. Drilling Co.
*Ingersoll-Rand Co.
Pennsylvania Drilling Co.

Drills (Diamond)
*Chicago Pneumatic Tool Co.
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Hand-Hammer)
*Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.
*Ingersoll-Rand Co.

Drills (Rock)
*Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.
*Ingersoll-Rand Co.
*Jeffrey Mfg. Co.

Drills (Water Well)
*Bucyrus-Erie Co.

Drills (Well) (See Drills—Blast-Hole)

Drives (Multiple, Belt, Chain, Rope)
*Allis-Chalmers Mfg. Co.

Dryers
*Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mch. Co.
McLanahan and Stone Corp.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

Dust Arresters
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Dracco Corporation
*Parsons Engineering Corp.
*Schneible Co., Claude B.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Collecting Systems
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
*Blaw-Knox Co.
*Dracco Corporation
*Parsons Engineering Corp.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Schneible Co., Claude B.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Conveying Systems
Allen-Sherman-Hoff Co.
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Dracco Corporation
*Fuller Company
*Parsons Engineering Corp.
*Schneible Co., Claude B.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Filters
*Parsons Engineering Corp.
*Schneible Co., Claude B.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Handling Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Dynamite (See Explosives)

Electrical Equipment
*Allis-Chalmers Mfg. Co.

Electrodes (Welding)
Stuls-Sickles Co.

Elevator Belting (See Belting)

Elevators (See Conveyors and Elevators)

Eliminators (Soft Stone) (See Soft Stone Eliminators)

Engineers
*Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Bradley Pulverizer Co.
*Fuller Company
Hetherington & Berner, Inc.
Holmes & Bros., Inc., Robt.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.

Engine Generator Sets
See Generator Sets (Engine).

Engines (Diesel)
Caterpillar Tractor Co.
*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.
Murphy Diesel Co., Ltd.
National Supply Co. of Del.
*Nordberg Mfg. Co.

Engines (Hoisting)
Clyde Iron Works, Inc.

Engines (Internal-Combustion)
Caterpillar Tractor Co.
*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.
Murphy Diesel Co., Ltd.
National Supply Co. of Del.
*Nordberg Mfg. Co.

Engines (Steam)
*Ingersoll-Rand Co.
*Morris Machine Works
*Nordberg Mfg. Co.

Excavating Machinery (See Shovels; Cranes; Buckets, etc.)

Excavators—Shallow Grading (Bucket Elevator Type)
Haiss Mfg. Co., Geo.

Explosives
Atlas Powder Co.

Fabricating (Electric Arc and Oxy-Acetylene)
Stuls-Sickles Co.

Fans (Exhaust)
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Feeders
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Babcock & Wilcox Co.
Bartlett & Snow Co., C. O.
Bradley Pulverizer Co.
*Fuller Company
*Huron Industries Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
*Pioneer Engineering Works
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.

Floor Sweeping Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

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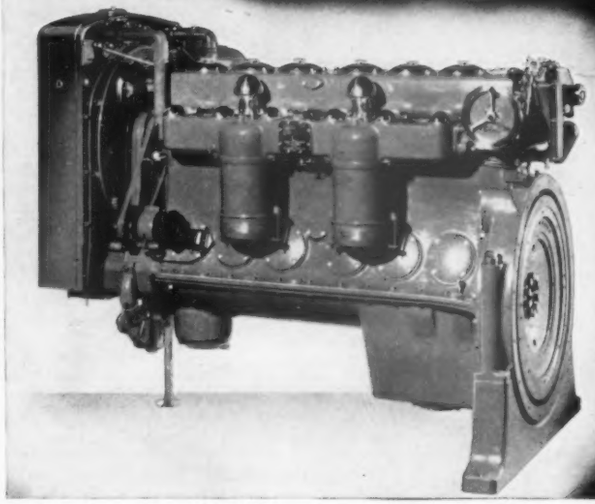

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IN HUMAN SYMPATHY FOR WORKERS—

SLY DUST FILTERS ON TOP OF SILOS

It is a Business Investment for Profits

Insure your workmen—to be sure! But also insure profits to yourself.

Workers under good conditions are profit makers for *you*. Under any other conditions they are an expense.

ASK FOR A SLY SALES ENGINEER to analyze your dust problem. Ask him to eliminate the hazard entirely. He can—he will.

THE W·W SLY MFG·CO·CLEVELAND·OHIO

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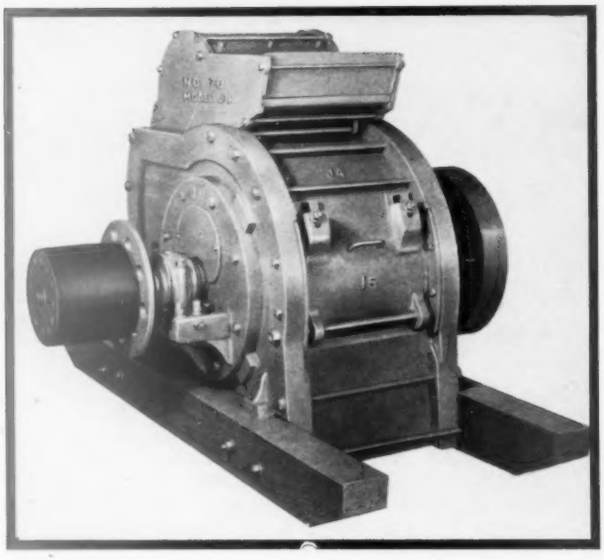
is a **MONEY-MAKER**



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In A DAY

BROOKS EQUIPMENT & MFG. CO.
KNOXVILLE TENNESSEE

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Index to Advertisers on Page 128

Forges (Oil)
Gardner-Denver Co.

Fuses (Detonating)
Atlas Powder Co.
*Ensign-Bickford Co.

Gaskets
*Cincinnati Rubber Mfg. Co.
Quaker City Rubber Co.

Gasoline Engines (See Engines—Internal-Combustion)

Gates (Bin) (See Bin Gates)

Gates (Clamshell)
*Haiss Mfg. Co., Geo.
*Link-Belt Co.

Gears (Herringbone)
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.

Gears and Pinions
Bartlett & Snow Co., C. O.
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
*Sprout, Waldron & Co.

Gelatin (See Explosives)

Generators (See Motors and Generators)

Generator Sets (Engine)
Murphy Diesel Co., Ltd.
National Supply Co. of Del.

Glass Sand Equipment
Lewistown Foundry & Machine Co.

Grab Buckets (See Buckets—Clamshell, Orange - Peel, etc.)

Grapples
Owen Bucket Co.

Grating (Steel)
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Hendrick Mfg. Co.

Greases
*Gredag Corp., The

Grinding Balls (See Balls, Grinding)

Grizzly Feeders
*Jeffrey Mfg. Co.
*Traylor Engr. & Mfg. Co.

Grizzlies
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
*Eagle Iron Works
*Hendrick Mfg. Co.
*Huron Industries Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mach. Co.
Manganese Steel Forge Co.
*Robins Conveying Belt Co.
Smith Engr. Works

Guards (Wire)
Bartlett & Snow Co., C. O.
Manganese Steel Forge Co.
National Wire Cloth Co.

Guns (Hydraulic)
Hetherington & Berner, Inc.
Taylor Forge & Pipe Works

Hammer Mills (See Crushers—Hammer)

Heaters (Bitumen)
*Easton Car & Construction Co.

Hoists
Bartlett & Snow Co., C. O.
*Chicago Pneumatic Tool Co.
Clyde Iron Works, Inc.
Gardner-Denver Co.
Hetherington & Berner, Inc.
*Ingersoll-Rand Co.
*Jaeger Machine Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Pioneer Engineering Works
*Sauerman Bros., Inc.
Smith Engr. Works
*Sprout, Waldron & Co.

Hoppers
*Chicago Bridge & Iron Co.
*Hendrick Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.

Hose (Air, Steam and Water)
*Chicago Pneumatic Tool Co.
*Cincinnati Rubber Mfg. Co.
*Ingersoll-Rand Co.
Manhattan Rubber Mfg. Co.
Quaker City Rubber Co.
United States Rubber Co.

Hose (Fire and Suction)
Quaker City Rubber Co.

Hose (Radiator-Engine Cooling)
Quaker City Rubber Co.
United States Rubber Co.

Hose Couplings (See Couplings)

Hydraulic Guns (See Guns—Hydraulic)

Idlers
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Indicators (Material Level)
*Fuller Company

Joist and Slab Machines (Concrete)
R & L Concrete Machinery Co.

Kilns and Coolers (Rotary)
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Kilns (Vertical)
*Chicago Bridge & Iron Co.

Kominuters
*Smidth & Co., F. L.

Lime-Handling Equipment
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
*Fuller Company
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Robins Conveying Belt Co.

Lime and Hydrating Plants
*Chicago Bridge & Iron Co.
Traylor Engr. & Mfg. Co.

Lime Kilns
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Lime Putty Plants
*Chicago Bridge & Iron Co.

Liners, Car (Paper)
Hummel-Foley Corp.

Linings (Ball- and Tube-Mill) (See Mill Liners and Linings)

Loaders and Unloaders
Bartlett & Snow Co., C. O.
*Bucyrus-Erie Co.
*Fuller Company
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Locomotives (Diesel)
*Whitcomb Locomotive Co.

Locomotives (Diesel-Electric)
*Whitcomb Locomotive Co.

Locomotives (Electric, Gas, and Steam)
*Lima Locomotive Works
*Whitcomb Locomotive Co.

Locomotives (Gas-Electric)
*Whitcomb Locomotive Co.

Locomotives (Oil-Electric)
*Whitcomb Locomotive Co.

Locomotives (Storage Battery)
*Jeffrey Mfg. Co.

Locomotives (Trolley-Battery)
*Jeffrey Mfg. Co.

Lubricants
*Gredag Corp., The

Magnetic Pulleys (See Pulleys, Magnetic)

Manganese Steel
Frog Switch & Mfg. Co.
Manganese Steel Forge Co.

Manganese Steel (Plates and Sheets)
Manganese Steel Forge Co.

* See also information in the 1938 Pit and Quarry HANDBOOK.

Manganese Steel Castings
Frog Switch & Mfg. Co.

Mechanical Rubber Goods
*Cincinnati Rubber Mfg. Co.
Manhattan Rubber Mfg. Co.
Quaker City Rubber Co.
United States Rubber Co.

Mill Liners and Linings
Babcock & Wilcox Co.
Bartlett & Snow Co., C. O.
Carnegie-Illinois Steel Corp.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Mills (Ball, Tube, etc.)
*Allis-Chalmers Mfg. Co.
*Traylor Engr. & Mfg. Co.

Mills (Grinding) (See also Crushers—Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Babcock & Wilcox Co.
Bartlett & Snow Co., C. O.
Bradley Pulverizer Co.
Brooks Equipment & Mfg. Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mach. Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Smidth & Co., F. L.
*Sprout, Waldron & Co.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Mixers
Blystone Mfg. Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Motors and Generators
*Allis-Chalmers Mfg. Co.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

Motor Trucks (Dual Rear Axle Drive Units)
Thornton-Tandem Co.

Moulds and Forms (Concrete)
Blystone Mfg. Co.
Dunn Mfg. Co., W. E.
Multiplex Concrete Machinery Co.
R & L Concrete Machinery Co.
Stearns Mfg. Co.

Netting (Locomotive Stack)
*Tyler Co., W. S.

Nozzles (Gravel Washing)
*Deister Concentrator Co.

Nozzles (Hydraulic) (See Guns—Hydraulic)

Nozzles (Spray)
*Deister Concentrator Co.

Oils
*Gredag Corp., The

Packings
*Cincinnati Rubber Mfg. Co.
Quaker City Rubber Co.

Pallets
Blystone Mfg. Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Partitions (Wire)
National Wire Cloth Co.

Paving Mixers
*Jaeger Machine Co.

Perforated Metal Plates
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
Chicago Perforating Co.
*Hendrick Mfg. Co.
*Sprout, Waldron & Co.

Pipe (Water, Gas, Low Pressure Steam)
Hetherington & Berner, Inc.

Pipe, Dredge (Floating and Shore)
*Chicago Bridge & Iron Co.
Naylor Pipe Co.
Taylor Forge & Pipe Works

Pipe Flanges
Hetherington & Berner, Inc.
Naylor Pipe Co.
Taylor Forge & Pipe Works

Pipe Fittings
Hetherington & Berner, Inc.

Pipe Forms (Concrete)
Concrete Pipe Machinery Co.
Quinn Wire & Iron Works
R & L Concrete Machinery Co.

Pipe Machines (Concrete)
Concrete Pipe Machinery Co.
Quinn Wire & Iron Works
R & L Concrete Machinery Co.

Pipe (Spiral)
Naylor Pipe Co.
Taylor Forge & Pipe Co.

Pipe (Welded)
Naylor Pipe Co.
Taylor Forge & Pipe Co.

Plants (Aggremeter) (See Aggremeter Plants)

Plug Valves (See Valves)

Pneumatic Conveying Systems (See Conveyors—Pneumatic)

Pneumatic Drills (See Drills, Rock)

Poidometers
Schaffer Poidometer Co.

Portable Conveyors
*Fuller Company
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Universal Crusher Co.

Portable Crushing and Screening Plants
*Austin-Western Road Machy. Co.
Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Pioneer Engineering Works
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Portable Engines (See Engines—Internal Combustion)

Portable Loaders (See Loaders and Unloaders)

Portable Washing Plants
*Universal Crusher Co.

Powder, (Black, Blasting) (See Explosives)

Power Units (Internal-Combustion)
Caterpillar Tractor Co.
*Chicago Pneumatic Tool Co.
Murphy Diesel Co., Ltd.
National Supply Co. of Del.
*Nordberg Mfg. Co.

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

Power Tampers (Concrete)
Blystone Mfg. Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Precipitators
*Western Precipitation Corp.

Pre-formed Wire Rope
*American Cable Division of the American Chain & Cable Co., Inc.
Broderick & Bascom Rope Co.
*Leschen & Sons Rope Co., A.

Press Machines (Hand, Concrete)
Blystone Mfg. Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Proportioning Equipment
*Blaw-Knox Co.
Heltzel Steel Form & Iron Co.
*Jaeger Machine Co.
Schaffer Poidometer Co.

Pulleys
*Huron Industries Co.
Sprout, Waldron & Co.

Pulleys (Magnetic)
*Sprout, Waldron & Co.

Pulleys (Wing)
*Sprout, Waldron & Co.

Pulverized Fuel Systems
Babcock & Wilcox Co.
Bartlett & Snow Co., C. O.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.

Pulverizers (See also Crushers, Mills, etc.)
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Bartlett & Snow Co., C. O.
Bradley Pulverizer Co.
Brooks Equipment & Mfg. Co.
*Gruendler Crusher & Pulverizer Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
New Holland Machine Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Smidth & Co., F. L.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

* See also information in the 1938 Pit and Quarry HANDBOOK.

The Schneible Multi-Wash Collector is the logical dust collector for your plant because it is fool-proof—uses no bags, screens or filters to clog or rapidly wear from highly abrasive rock dust—it has no moving parts to require lubrication—employs no nozzles or spray heads—no dead zones to clean out—nothing to wear, break or burn; and its operation is unaffected by heat, cold or moisture—it's non-freezing. Schneible Multi-Wash Dust Collectors are highly efficient.

Incoming air is drawn spirally upward over multiple impingement plates, the particles of dust becoming enveloped by the water which enters the collector near the top and which is automatically atomized in its fall from plate to plate. An entrainment separator removes free moisture before discharging the air. The sludge resulting from this washing process is conducted to a Dewatering Tank where water is recovered and used over again, and the sludge disposed of or recovered; or the collection water is used as the conveying medium to natural disposal point.

The Schneible Multi-Wash is a simple, economical, effective dust collector that is highly practical because it eliminates the frailties of other methods of dust collection.

Made in Junior and Senior Models of 2,000 to 30,000 c.f.m. capacity.

Send for Bulletin No. 110—it contains the complete story!

CLAUDE B. SCHNEIBLE CO.
DUST SUPPRESSION ENGINEERS
3951 LAWRENCE AVENUE, CHICAGO OFFICES IN PRINCIPAL CITIES

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Index to Advertisers on Page 128

Pump Valves (See Valves, Pump)

Pumps (Air-Lift)
*Chicago Pneumatic Tool Co.
*Fuller Company
*Ingersoll-Rand Co.

Pumps (Bulk Cement)
*Fuller Company

Pumps (Cement Slurry)
Allen-Sherman-Hoff Co.
*Morris Machine Works
*Smidth & Co., F. L.

Pumps (Centrifugal)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
*Ingersoll-Rand Co.
*Jaeger Machine Co.
Kansas City Hay Press Co.
*Morris Machine Works
Peerless Pumps Division of The Food Machinery Corp.

Pumps (Dewatering)
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works
*Morris Machine Works
Peerless Pumps Division of The Food Machinery Corp.

Pumps (Dredging)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
*Bucyrus-Erie Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works

Pumps (Sand and Gravel)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
*Ingersoll-Rand Co.
Kansas City Hay Press Co.
*Morris Machine Works

Pumps (Sump)
*Chicago Pneumatic Tool Co.
*Ingersoll-Rand Co.
Peerless Pumps Division of the Food Machinery Corp.

Pumps (Turbine)
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works
*Morris Machine Works
Peerless Pumps Division of The Food Machinery Corp.

Pumps (Vacuum)
*Chicago Pneumatic Tool Co.
*Fuller Company
*Ingersoll-Rand Co.

Pumps (Vertical)
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works
*Morris Machine Works
Peerless Pumps Division of The Food Machinery Corp.

Pumps (Well)
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works
*Morris Machine Works
Peerless Pumps Division of The Food Machinery Corp.

Racks (Curing)
Blystone Mfg. Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Ready-Mixed Concrete Plants
Bartlett & Snow Co., C. O.
Heltzel Steel Form & Iron Co.
*Jaeger Machine Co.

Recuperators
*Manitowoc Engineering Works

Rock Drills (See Drills—Rock)

Rod Mills
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Traylor Engr. & Mfg. Co.

Rods (Welding)
Stulz-Sickles Co.

Rope (Wire) (See Wire Rope)

Sand and Gravel Handling Equipment
*Jeffrey Mfg. Co.
*Link-Belt Co.

Sand Separators
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Pioneer Engineering Works
Smith Engr. Works

Sand—Lime—Brick Machinery
*Hardinge Co.

Sand-Settling Tanks
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Nordberg Mfg. Co.
*Pioneer Engineering Works
Smith Engr. Works

Scrapers (Power Drag)
*Austin-Western Road Machy. Co.
Continental Roll & Steel Fdry. Co.
*Link-Belt Co.
*Pioneer Engineering Works
*Sauerman Bros., Inc.

Scrapers (Wagon)
*Bucyrus-Erie Co.
Continental Roll & Steel Fdry. Co.

Screens
*Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Bartlett & Snow Co., C. O.
Carnegie-Illinois Steel Corp.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
*Deister Concentrator Co.
*Deister Machine Co.
*Eagle Iron Works
*Gruendler Crusher & Pulverizer Co.
*Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
National Wire Cloth Co.
*Nordberg Mfg. Co.
*Pioneer Engineering Works
*Robins Conveying Belt Co.
Simplicity Engr. Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
*Universal Crusher Co.

Screens (Vibrating or Shaking)
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
Bartlett & Snow Co., C. O.
*Deister Concentrator Co.
*Deister Machine Co.
*Gruendler Crusher & Pulverizer Co.
*Huron Industries Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Nordberg Mfg. Co.
*Pioneer Engineering Works
*Robins Conveying Belt Co.
Screen Equipment Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Tyler Co., W. S.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Scrubbers
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

Seal Rings
*Huron Industries Co.

Separators (Air) (See Air Separators)

Separators (Slurry)
*Smidth & Co., F. L.

Sheaves
*Allis-Chalmers Mfg. Co.
*Eagle Iron Works
*Gruendler Crusher & Pulverizer Co.
Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Link-Belt Co.
*Jeffrey Mfg. Co.
McLanahan and Stone Corp.
*Sprout, Waldron & Co.

Shovels (Electric, Internal-Combustion and Steam)
*Austin-Western Road Machy. Co.
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
General Excavator Co.
*Lima Locomotive Works, Inc.
*Link-Belt Co.
*Manitowoc Engineering Works
Marion Steam Shovel Co.
Northwest Engr. Co.

Silos
*Chicago Bridge & Iron Co.
*Smidth & Co., F. L.

Skip Hoists and Skips
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
Clyde Iron Works, Inc.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Sleeves (Dredge)
*Cincinnati Rubber Mfg. Co.
Quaker City Rubber Co.

Speed Reduction Units
*Huron Industries Co.
*Link-Belt Co.

Spirals (Lowering)
Holmes & Bros., Inc., Robt.

Spouts (See Chutes and Chute Liners)

Sprays
*Deister Concentrator Co.

Sprockets and Chain
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.

Stabilized Road Mix
*Calcium Chloride Association

Stackers
*Jeffrey Mfg. Co.

Steel (Alloy)
(See Alloys—Steel)

Steel (High Tensile)
Manganese Steel Forge Co.

Steel (Open Hearth)
Manganese Steel Forge Co.

Steel Grating (See Grating, Steel)

Steel Plate Construction
*Chicago Bridge & Iron Co.
Heltzel Steel Form & Iron Co.
Hetherington & Berner, Inc.
Holmes & Bros., Inc., Robt.
Manganese Steel Forge Co.
*Sprout, Waldron & Co.

Stokers
Babcock & Wilcox Co.

Stone Grapples
Owen Bucket Co.

Storage Equipment
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Surfacers (Concrete)
*Ingersoll-Rand Co.

Sweeping Systems
Allen-Sherman-Hoff Co.

Tamp Machines (Hand, Concrete)
Blystone Mfg. Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Tanks
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
Heltzel Steel Form & Iron Co.
*Hendrick Mfg. Co.
*Link-Belt Co.
*Pioneer Engineering Works
*Schneible Co., Claude B.
*Traylor Engr. & Mfg. Co.

Tanks (Dewatering)
*Schneible Co., Claude B.

Tanks (Elevated Steel)
*Chicago Bridge & Iron Co.

Tanks (Sand-Settling)
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Pioneer Engineering Works
Smith Engr. Works

Testing Sieves and Shakers
*Hendrick Mfg. Co.
*Tyler Co., W. S.

Tire Repair Materials
United States Rubber Co.

Tires (Truck, Passenger Car, Tractor)
United States Rubber Co.

Tools (Drill) (See Drilling Accessories)

Track Shifters
*Nordberg Mfg. Co.

Tractors
*Allis-Chalmers Mfg. Co.
Caterpillar Tractor Co.

Trailers (Industrial)
*Easton Car & Construction Co.

Transformers
*Allis-Chalmers Mfg. Co.

Transmission Belting (See Belting)

Transmission Machinery
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Trippers
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Truck Cranes (See Cranes)

Truck Mixers
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Jaeger Machine Co.

Trucks and Trailers (See Motor Trucks)

Tube-Mills (See Mills—Ball, Tube, etc.)

Tubes (For Tire Casings)
Quaker City Rubber Co.
United States Rubber Co.

Turntables (Railway Industrial)
*Easton Car & Construction Co.

Underground Loaders
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.

Unloaders (Box Car)
Bartlett & Snow Co., C. O.
*Fuller Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Valves (Pump)
*Cincinnati Rubber Mfg. Co
Quaker City Rubber Co.
Taylor Forge & Pipe Works

Variable Speed Reducers or Transmissions
*Link-Belt Co.

Vibrating Screen Plate
Bartlett & Snow Co., C. O.
Chicago Perforating Co.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.

Vibrating Screens (See Screens—Vibrating)

Vibrators
*Ingersoll-Rand Co.
*Jeffrey Mfg. Co.
*Tyler Co., W. S.

Wagon Scrapers
Continental Roll & Steel Fdry. Co.

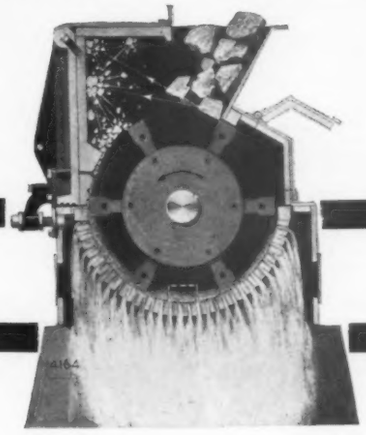
Wagons (Dump)
*Austin-Western Road Machy. Co.
*Easton Car & Construction Co.
*LeTourneau, Inc., R. G.

Washers (Sand, Gravel and Stone)
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
Bartlett & Snow Co., C. O.
*Eagle Iron Works
*Haiss Mfg. Co., Geo.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Mach Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Pioneer Engineering Works
*Smidth & Co., F. L.
Smith Engr. Works
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
*Universal Crusher Co.

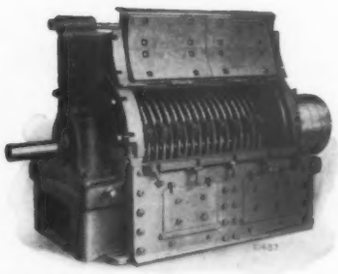
* See also information in the 1938 Pit and Quarry HANDBOOK.

JEFFREY

SWING HAMMER PULVERIZERS

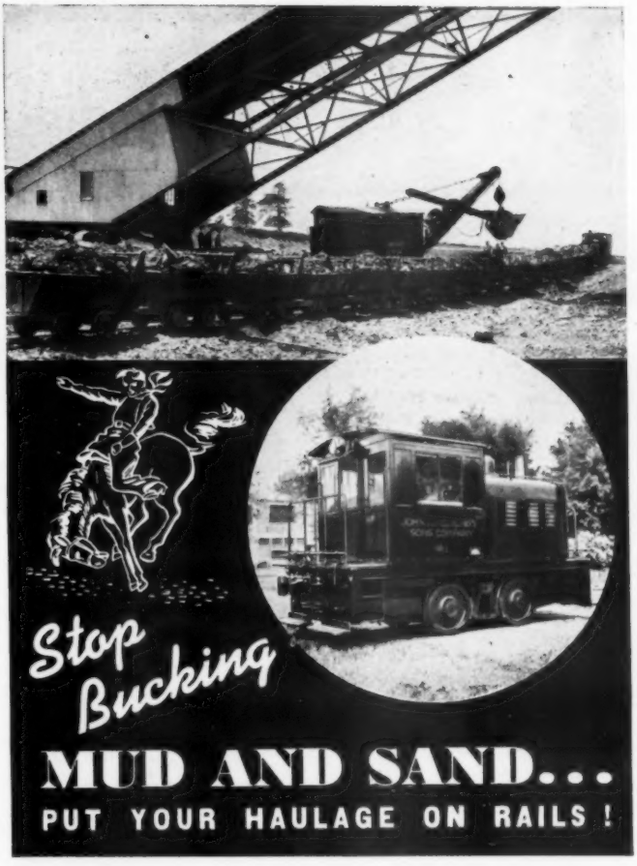


- Designed for continuous and efficient operation under the most exacting conditions. Note sturdy construction to eliminate breakage.
- Type "A" swing hammer pulverizer for average requirements and moderate capacities . . . Type "B" for finer reduction, break-down and heavier work. Both have an established record for the economical reduction of limestone, shale, clay, chalk, marl, gypsum, phosphate rock and other products in the stone products field.
- Jeffrey swing hammer pulverizers reduce through a series of distinct steps, the greater part of the reduction being done in the upper chamber while the material is in suspension. This patented method results in a substantial power saving, less maintenance, increased capacity and more uniform product.
- Jeffrey equipment and plant engineering cover the entire stone products industry . . . sand and gravel, crushed stone and cement. We are prepared to furnish a single unit or a complete plant.



THE JEFFREY MANUFACTURING CO.

917-99 NORTH FOURTH STREET, COLUMBUS, OHIO



Why waste haulage power in fighting ground resistance and plowing over temporary roads? Whitcomb Locomotives on smooth, easily transportable steel track, permits one man to haul more loads with less fuel. And Whitcomb Locomotives effect additional savings because they give more years of service at lower up-keep cost. Compare Whitcomb Locomotives also with other similar equipment. Discover the extra quality resulting from Baldwin-Whitcomb combined resources and experience.

Unbiased Recommendations

Our large line includes the right type of power for every purpose. Let our engineers survey your needs and give you real operating cost figures. There is no obligation incurred.

YOUR CHOICE OF POWER

Gasoline or Diesel Mechanical Drive
Gasoline or Diesel Electric Drive
Electric Storage Battery
Electric Trolley

THE WHITCOMB LOCOMOTIVE COMPANY

Plant at Rochelle, Illinois

Subsidiary of The Baldwin Locomotive Works. All sales made by The Baldwin Locomotive Works, Paschall Station Post Office, Philadelphia, Pennsylvania.

WHITCOMB LOCOMOTIVES

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Index to Advertisers on Page 128

Weighing Equipment (Automatic)
*Blaw-Knox Co.
*Fuller Co.
Heltzel Steel Form & Iron Co.
*Jaeger Machine Co.
Schaffer Poidometer Co.

Welding Bars, Wedge and Applicator (Nickel - Manganese Steel)
Stulz-Sickles Co.

Welding and Cutting Equipment
Stulz-Sickles Co.

Welding Rods
Bradley Pulverizer Co.
Stulz-Sickles Co.

Welding Service
Stulz-Sickles Co.

Welding Supplies
Manganese Steel Forge Co.
Stulz-Sickles Co.

Well Drills (See Drills—Well)

Wheels (Car)
*Eagle Iron Works

Wheel Rims. See Rims—Wheel

Winches and Capstans
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Wire Cloth
Cleveland Wire Cloth & Mfg Co.
Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
National Wire Cloth Co.
*Robins Conveying Belt Co.
*Tyler Co., W. S.

Wire Rope
*American Cable Division of the American Chain & Cable Co., Inc.
Broderick & Bascom Rope Co.
Leschen & Sons Rope Co., A.

Wire Rope Fittings
*American Cable Division of the American Chain & Cable Co., Inc.
Broderick & Bascom Rope Co.
Leschen & Sons Rope Co., A.

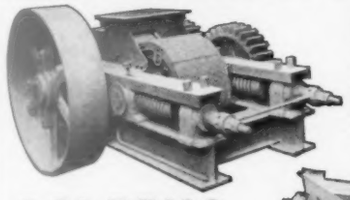
Wire Rope Slings
*American Cable Division of the American Chain & Cable Co., Inc.
Broderick & Bascom Rope Co.
Leschen & Sons Rope Co., A.

Wire (Welding)
Manganese Steel Forge Co.

Worm Gears (See Gears and Pinions)

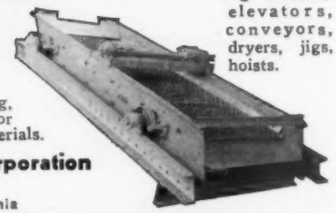
* See also information in the 1938 Pit and Quarry HANDBOOK.

McLANAHAN EQUIPMENT



CRUSHERS

Single and double roll and jaw crushers, hammer mills, super dry pans, — steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists.



SCREENS

Complete portable, semi-portable and stationary crushing, screening and washing plants for different capacities of any materials.

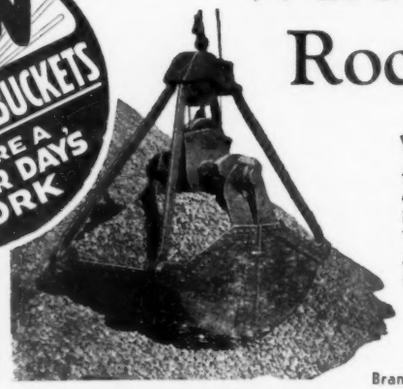
McLanahan & Stone Corporation
Established 1835
Hollidaysburg, Pennsylvania

Lewistown Foundry Products ARE Performance-Tested

BUCKET ELEVATORS
REVOLVING SCREENS
CRUSHERS DRY PANS

Lewistown Foundry & Machine Co.
Lewistown, Pa.

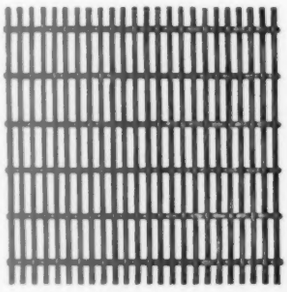
Whether You Handle Rock---Sand---Gravel



WE CAN furnish the proper bucket for your particular requirements. Years of research, coupled with tests under all working conditions, have enabled OWEN engineers to develop buckets which obtain capacity grabs in all materials, and are designed for rapid dumping action. These are but a few of the many features which assure you, as an OWEN operator, a high position in the performance field. Write for the FREE CATALOG.

THE OWEN BUCKET CO.
6050 Breakwater Ave., Cleveland, O.
Branches: NEW YORK - PHILADELPHIA - CHICAGO - BERKLEY, CAL.

ALLOY No. 2



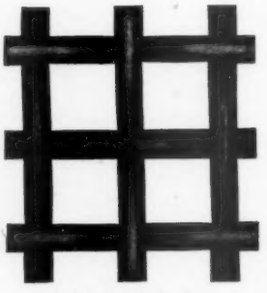
Rolled Slot

A super wearing Steel developed to resist the abrasion and vibration of modern screening demands.

"CLEVELAND" SCREENS

A wire cloth of guaranteed accuracy backed by fine workmanship and an effort to satisfy.

Available in Square Mesh and Rolled Slot. A trial will convince you of the superiority.



2 Mesh .162 Ga.

THE CLEVELAND WIRE CLOTH & MFG. COMPANY
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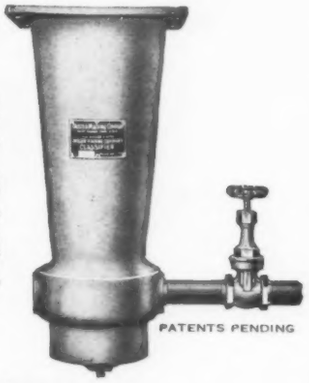
COMPOUND FUNNEL CLASSIFIER



For sizing minus 5/16" gravel and sand, and for cleaning it by washing out silt and other light impurities.

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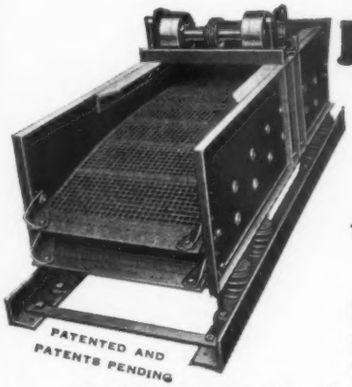

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Improved Heavy Duty

VIBRATING SCREEN

Built in all standard sizes—in from one to three decks.

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Designed for all work that requires a traveling, revolving, long reach, heavy duty steel derrick.

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- LARGE LOADS
- SCIENTIFIC DESIGN
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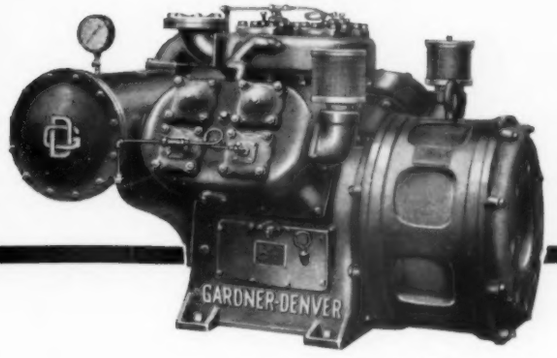
THESE FEATURES SAVE YOU MONEY



Gardner-Denver "WB" Compressor with built-in motor.

Water cooling—for constant service. Water cooling protects cylinder walls in both hot and cold weather . . . reduces oil consumption; lengthens compressor life.

Two-stage type design insures highest efficiency in the use of power.

Electric power from built-in motor—compact—economical to operate, easy to maintain.

Sturdy construction—well balanced, quiet, vibrationless . . . force-feed lubrication . . . Timken tapered roller main bearings.

These are only a few of the features of the Gardner-Denver "WB" Compressor that make it a more economical way to increase your air supply . . . that assure greater dependability in meeting your air demands.

Write us for further information

GARDNER-DENVER COMPANY QUINCY, ILLINOIS

Since 1859

GARDNER-DENVER

Above is a Sauerman Slackline moving gravel from river bar to top of screening plant. Below is Sauerman Scraper digging from high hill.

Dig and Haul for Few Cents per Cubic Yard

Wherever there is a problem of excavating sand and gravel, stripping overburden, stockpiling bulk materials, or other work involving hauls of any distance from 100 to 1500 ft.—it pays to find out what a Sauerman Slackline or Drag Scraper will do and what it will cost. In most cases a Sauerman machine shows a saving in comparison with any other equipment that will dig and haul an equal yardage.

Tell us about your problem. We will send you our 84-page catalog and advice based on our 25 years' experience.

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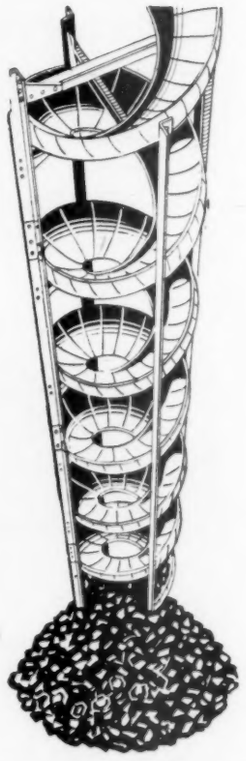
Do Two Jobs in One..

Material can be lowered and piled and mixed at the same time with Holmes Lowering Spirals. As the material slides gently around the spirals to the bottom, any two or more sizes of material may be evenly deposited to prevent segregation.

Every installation of spirals is tailor-made for the particular job. That's why it works so well wherever it is used. Let our engineers consult with you.



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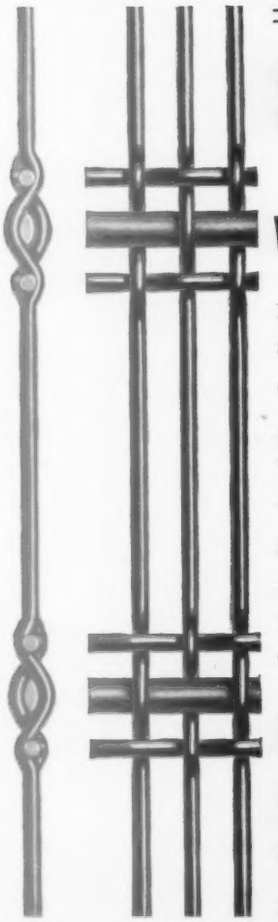
DANVILLE ILLINOIS



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Long-Mesh Woven Wire Screens

made to work under tension and vibration.

The straight stay - bars carry ALL the tension. The crimps in the round wires can not be stretched or broken. The screen can not be caused to sag or split by the pull of the tensioning device.

LUDLOW-SAYLOR
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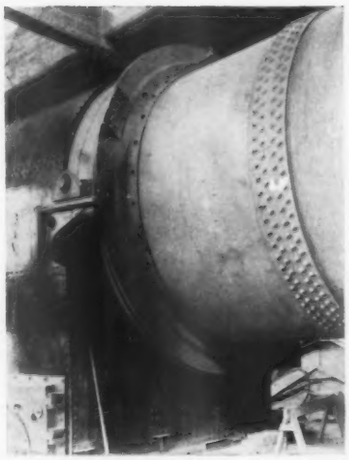
STOP



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HURON SEAL RINGS

They Increase Kiln Efficiency from 7% to 12%

At last the weak spot in kiln walls has been overcome by the development of Huron Seal Rings. They provide a positive method of sealing the joints between the revolving and stationary parts of rotary kilns, dryers and coolers. The resultant savings in fuel, prevention of dust losses and better temperature control, not only increase heating efficiency but insure economies in labor and maintenance.

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for Joining and Repairing

CONVEYOR BELTS

FLEXCO HD

BELT FASTENERS **RIP PLATES**

U. S. Pat. 1,382,799

FLEXCO HD BELT FASTENERS make a tight butt joint of great strength and long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Five sizes in steel and alloys.

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FLEXIBLE STEEL LACING CO.

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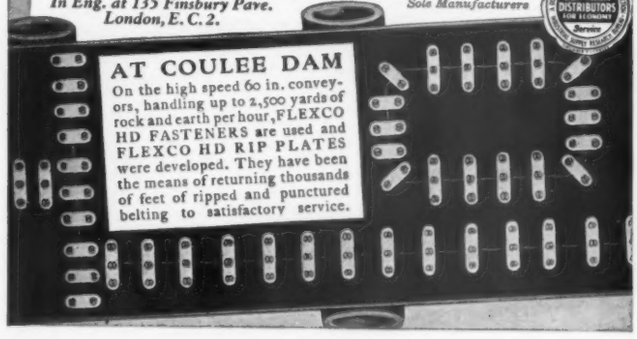
In Eng. at 135 Finsbury Pave. London, E. C. 2. *Sole Manufacturers*



AT COULEE DAM

On the high speed 60 in. conveyors, handling up to 2,500 yards of rock and earth per hour, FLEXCO HD FASTENERS are used and FLEXCO HD RIP PLATES were developed. They have been the means of returning thousands of feet of ripped and punctured belting to satisfactory service.

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● Profit by the ideas gained from thousands of practical cost-cutting installations handling all kinds of materials, such as sand, gravel, crushed stone, coal, coke, clay, fertilizer, lime, ores, grain, sugar, chemicals, pulpwood chips, etc.

Submit your screening problems to Link-Belt. Send for Catalog No. 1562.

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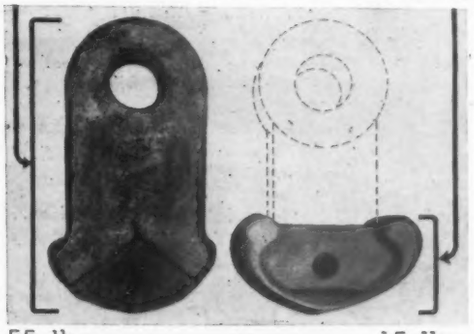
LINK-BELT *Vibrating* **SCREENS**

DO YOU THROW AWAY

THIS - - - or - - - THIS



55 lbs. - - - or - - - 15 lbs.

when you replace your hammers

Let us tell you the savings effected by using

ESCO RENEWABLE HEAD HAMMERS

These hammers have been used by several leading cement mills on the Pacific Coast for several years with complete success. Write today.

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ELECTRIC STEEL FOUNDRY CO.

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The **VANDERWERP RECUPERATOR**

for Rotary Kilns

The Recuperator is now accepted as the one and only air-quenching type of cooler offering adequate protection against excessive expansion in high-magnesia cements. It insures:

- ***Improved Quality of Cement***
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Kiln operators interested in obtaining the maximum benefits from air quenching and heat recovery — with proven equipment — are requested to write, without obligation, for full particulars.

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Division of

Manitowoc Ship Building Company

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COTTRELL PRECIPITATORS . . . MULTICLONES . . . SPRAY DRYERS
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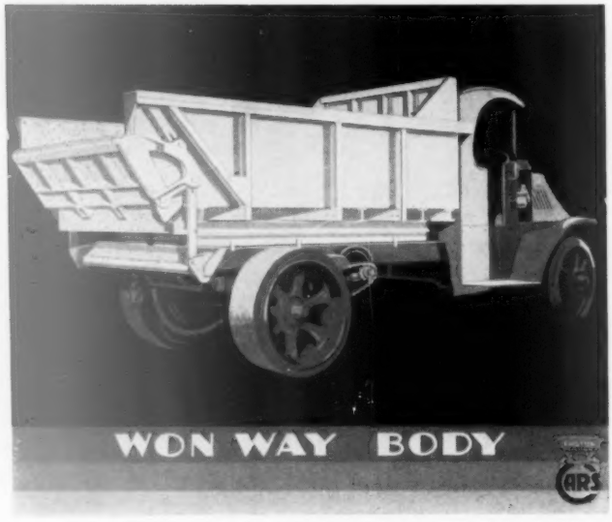

- **strength** in abundance, in excess of its ultimate requirements, fits the Won Way Body for shovel and quarry abuse . . . its rigidity remains pronounced over years of constant use.
- **symmetry** that expresses harmonious relationship to the truck proper . . . that lends appeal from the visual as well as the practical point of view.
- **stamina** in the Won Way Body is most evident in the details of its design . . . its Herculean structure assures lasting endurance.

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LIGHTNING PUMPS

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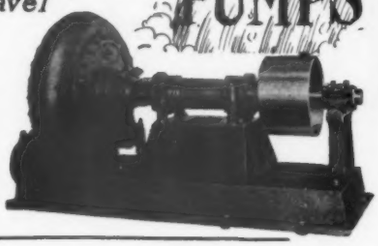

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Rotary Type

OIL OR COAL FIRED
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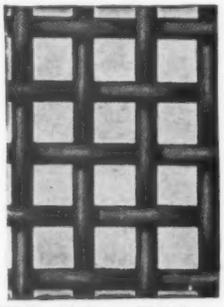

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at Lower Cost

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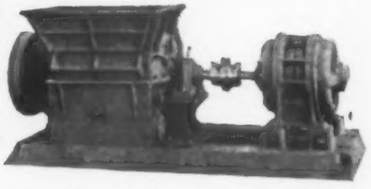

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PERFORATED
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11 to 13½% Nickel Manganese Steel

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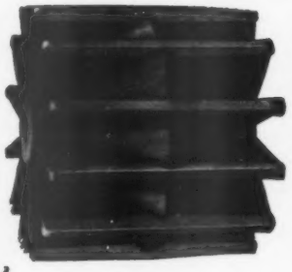
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Material conveyed cannot lodge between belt and pulley to cut your belts.
Interchangeable with standard pulleys.
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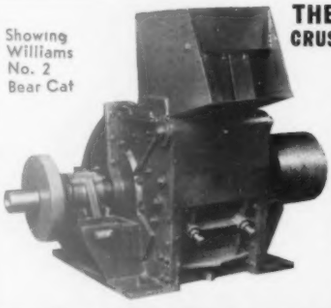
Elevating, Conveying and Transmission Equipment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HANDLES LARGE STONE
Rows of heavy, free swinging, fast revolving hammers, crush the material by impact until of proper size to pass through the grates. By reducing large rock to 1¼", ¾" or agricultural size in one operation, the "Bear Cat" has enabled operators to produce these sizes at a very low cost per ton and with small investment.
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CONVEYING SYSTEMS FOR PULVERIZED, FINE, CRUSHED & GRANULAR MATERIALS
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AIR COMPRESSORS

8—Stationary high pressure: 1—1100′ Bury; 1—888′ Ingersoll Rand, 19x 12x16″; 1—527′ Gardner Denver mod. ABH-1005; 1—513′ Sullivan class WG6, 14x12″; 1—330′ Gardner size 11x10″; 2—136′ size 8x8″ (1—Bury; 1—Chgo. Pneu.); 1—82′ Gardner Denver, 5x4½″.

35—Portable gas driven air compressors, 310, 220, 160, 110, 92 Ingersoll Rand, Chgo. Pneu. Tool, Gardner Denver, Schramm, Barnes, Domestic, Sullivan.

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2—3-compartment with scales, 8000 lbs. cap.: 1—150 ton Blaw Knox; 1—112 ton Butler.

9—2-compartment: 4—118 ton Blaw Knox; 1—87 ton Blaw Knox; 1—60 ton Butler; 2—35 ton Blaw Knox; 1—26 ton Heltzel. With or without weigh batchers.

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1—230 bbl. Butler portable bulk cement batching plant, complete with elevator.

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1—4 yd. Hayward class G clamshell.

35—Williams, Blaw Knox & Owen clamshell—all sizes and types.

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Large lot including std. ga. 6 & 12 yd. and 20 yd., 36 ga. 5 yd. and 24 ga. 1½ yd. Also std. ga. flat cars and ballast cars.

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9—Port. belt conveyors with steel frame, gas or elec. pr. 18 & 24 in. Barber Greene.

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1—Link Belt K-55 ser. No. 1698, 70′ boom, 2 yd. bucket; also have shovel attachment.

1—Link-Belt Mod. K-42 Ser. No. 1265, 45′ boom, 1¼-yd. bucket.

2—Northwest mod. 104, ser. Nos. 2079 and 1597, 45′ boom, 1¼ yd. bucket; one with shovel attachment.

1—Northwest mod. 105, ser. No. 2053, 40′ boom, 1 yd. bucket.

1—Link Belt mod. K-1, ser. No. 1024, 50′ boom, 1 yd. bucket.

1—Osgood Heavy Duty, ser. No. 2069, 40′ boom, 1 yd. bucket and with shovel attachment.

1—American Gopher GS-184, 50′ boom, 1 yd. bucket.

1—Bucyrus-Erie, mod. 1030, ser. No. 10512, with ¾ yd. shovel front.

1—Brownhoist No. 1 comb. shovel and crane No. 10057, 30′ boom, ½ yd. shovel front.

1—Byers Bearcat crane, mod. 27, ser. No. 5289, half circle swing, ½ yd. bucket.

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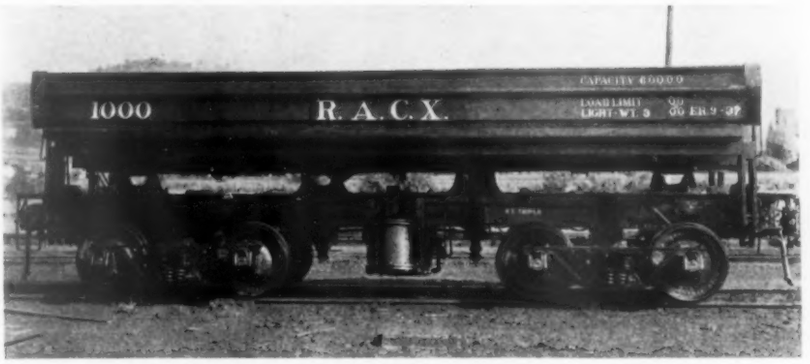

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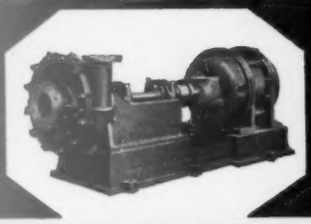

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Index to Advertisers

Allen-Sherman-Hoff Co. .. Inside Front Cover
*Allis-Chalmers Mfg. Co.... 27
*American Cable Division of American Chain & Cable Co. .....Inside Back Cover
*American Chain & Cable Co. Inside Back Cover
*American Pulverizer Co.... 119
Armstrong-Bray Co. 128
Atlas Powder Co..... 14
Aububon Wire Cloth Corp.. 120
*Austin-Western Road Machy. Co. 20

Babcock & Wilcox Co..... 29
Bacon, Inc., Earle C..... 104
*Baldwin Locomotive Works. 113
Bartlett & Snow Co., C. O.. 119
Bay City Shovels, Inc..... 100
Birmingham Rail & Locomotive Co. 123
*Blaw-Knox Co. 85
Blue Ball Machine Works.. 127
Blystone Mfg. Co..... 82
Bradley Pulverizer Co..... 119
Broadcast Section 121–127
Broderick & Bascom Rope Co. 120
*Brooks Equip. & Mfg. Co.. 110
*Bucyrus-Erie Co. 2
*Bucyrus-Monighan Co. 2
Burnham, Royal E..... 126

*Calcium Chloride Ass'n... 81
Carnegie-Illinois Steel Corp. 28
Caterpillar Tractor Co..... 13
*Chicago Bridge & Iron Co.. 86
Chicago Perforating Co..... 96
*Chicago Pneumatic Tool Co. 120
*Cincinnati Rubber Mfg. Co.. 102
Cleveland Rock Drill Co.... 23
Cleveland Wire Cloth & Mfg. Co. 114
Clyde Iron Works, Inc..... 115
Concrete Pipe Machy. Co... 79
*Consolidated Products Co... 125
Continental Roll & Steel Fdry. Co. 18

*Deister Concentrator Co.... 103
Deister Machine Co..... 115
De Witt Hotels 118
*Dempster Bros., Inc..... 4
*Dixie Machy. Mfg. Co..... 98
*Dracco Corp. 101
Dunn Mfg. Co., W. E..... 83

*Eagle Iron Works 7
*Easton Car & Const. Co.... 118
Electric Steel Foundry Co.. 117
Elwood Sales & Mfg. Co.... 123
*Ensign-Bickford Co. 26
Equipment Corporation of America 121
Erie Pump & Engine Works 120

Flexible Steel Lacing Co... 117
Food Machy. Corp..... 102
Fort, E. E..... 121
Frog, Switch & Mfg. Co... 94
*Fuller Co. 120

Gardner-Denver Co. 115
General Excavator Co.... 107
*Gruendler Crusher & Pulverizer Co. 95

*Haiss Mfg. Co., Geo..... 99
Heltzel Steel Form & Iron Co. 84
Hendrick Mfg. Co..... 119
Hetherington & Berner, Inc. 128
Hoffman Bros. Drilling Co. 126
Holmes & Bros., Inc., Robt. 116
Hummel-Foley Corp. 119
*Huron Industries Co..... 116
*Hyman-Michaels Co. 121–127

Illinois Minerals Co..... 125
*Ingersoll-Rand Co. .....Back Cover

Jaeger Machine Co..... 88
*Jeffrey Mfg. Co..... 113

Kansas City Hay Press Co.. 119
*Kennedy-Van Saun Mfg. & Engr. Corp. 107
Kentucky Hotel 118
Kleinhans Co., H..... 123

Lane Co., T. J..... 123
Leschen & Sons Rope Co., A. 95
*Le Tourneau, Inc., R. G... 12
Lewis, Harry C..... 125
Lewistown Foundry & Machine Co. 114
*Lima Locomotive Works .. 19
*Link-Belt Co. 1–117
Lovejoy Flexible Coupling Co. 99
Ludlow-Saylor Wire Co..... 116

Machinery Sales Corp..... 123
Manganese Steel Forge Co.. 120
*Manitowoc Engr. Works... 117
Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc. 3
Marion Steam Shovel Co... 11
McLanahan & Stone Corp.. 114
Morris Machine Works..... 128
Multiplex Concrete Machy. Co. 84
Murphy Diesel Co., Ltd.... 109

National Supply Co. 30
National Wire Cloth Co.... 119
Naylor Pipe Co. 105
New Holland Machine Co... 97
*Nordberg Mfg. Co..... 16
Northwest Engineering Co.. 17

Owen Bucket Co..... 114

*Parson Engr. Corp..... 94
Peerless Pump Division of Food Machy. Corp..... 102
Pennsylvania Drilling Co... 126
*Pioneer Engineering Works. 21

Quaker City Rubber Co.... 25
Quinn Wire & Iron Works. 86

R&L Concrete Machy. Co... 80
Railway Accessories Co.... 123
Raleigh Hotel 82
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc. 22
*Robins Conveying Belt Co. 32

*Sauerman Bros., Inc..... 116
Schaffer Poidometer Co.... 99
*Schneible Co., Claude B... 111
Screen Equipment Co..... 105
Sievert Electric Co. 127
*Sly Mfg. Co.. W. W..... 109
*Smidth & Co., F. L..... 120
Smith Engineering Works.. 15
Smith, Inc., L. B..... 123
Southern Iron & Equipment Co. 125
Sprout, Waldron & Co..... 120
Stanhope, Inc., R. C..... 125
Stearns Mfg. Co..... 86
Stulz-Sickles Co. 119
Sturtevant Mill Co..... 99

Taylor Forge & Pipe Works 97
Thornton Tandem Co..... 87
Timken Roller Bearing Co. 6
*Traylor Engineering & Mfg. Co. 5
*Tyler Co., W. S..... 104

Unted States Rubber Co... 8–9
United States Steel..... 28
*Universal Crusher Co..... 24

Walsh Co., Richard P..... 125
Warren Bros. Roads Co.... 82
*Western Precipitation Corp. 118
*Whitcomb Locomotive Co.. 113
*Williams Patent Crusher & Pulverizer Co. 120

***See also information in the 1938 Pit and Quarry HANDBOOK**

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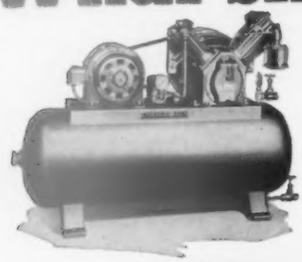
What size Compressor do you need

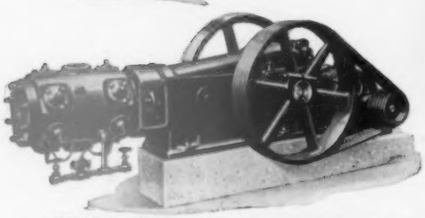
Is it for AIR or GAS

What is the PRESSURE

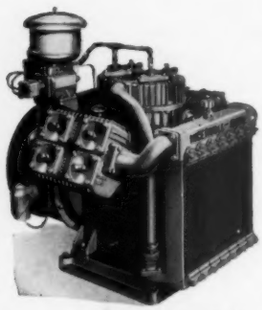
What kind of SERVICE



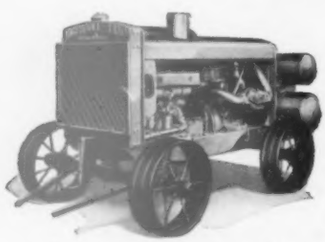
T-30 Self-contained air-cooled compressor. Sizes ¼ to 15 hp. Pressure to 1000 lbs. and vacuums.



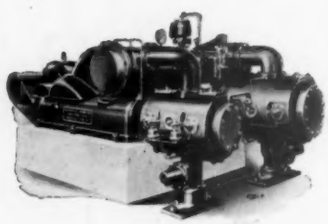
"ES" Heavy-duty air or gas compressor. Pressures 5 to 3000 lbs. and vacuums. Sizes 5 to 125 hp. Also for steam drive.



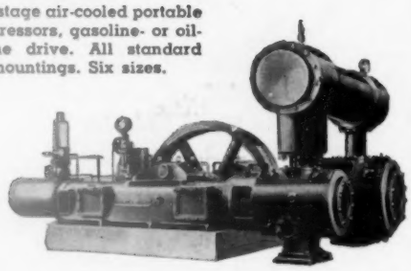
Two-stage air-cooled Motor-compressor. 80 to 125 lbs. pressure. 15 to 75 hp.



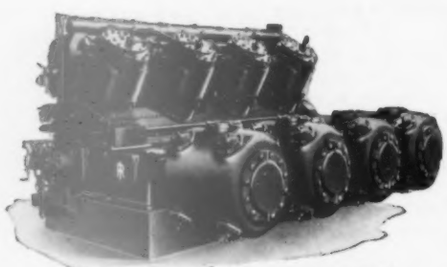
Two-stage air-cooled portable compressors, gasoline- or oil-engine drive. All standard mountings. Six sizes.



Duplex single- or multi-stage. Belted or direct-connected drive. Sizes 50 to 250 hp. Pressures up to 5000 lbs. and vacuums.

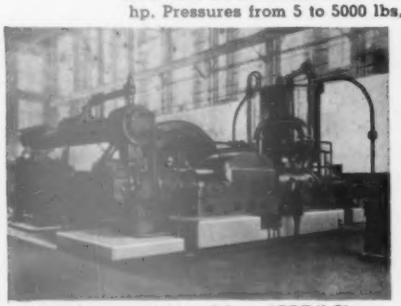


"XPV" Steam-driven compressor unit. Sizes 50 to 1500 hp. Pressures up to 5000 lbs. and vacuums.

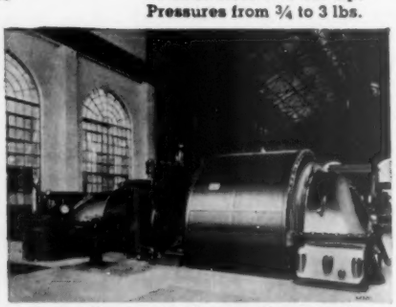


"XVG" with built-in gas-engine drive. "XVO" for oil drive. Sizes 60 to 300 hp. Pressures from 5 to 5000 lbs.

"FS" and "CS" single-stage centrifugal blowers. 73 sizes from 5 to 125 hp. Pressures from ¾ to 3 lbs.



Synchronous-motor-driven "PRE." Sizes 200 to 3000 hp. Pressures 5 to 5000 lbs.



Turbo-blowers for large volumes, relatively low pressures. Sizes up to 12000 hp.

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THE variety of types of Compressors shown on this page is not the result of an inventor's idle dream. On the contrary, each is a standard type which was pioneered by Ingersoll-Rand after years of concentrated development work and close association with the field problems involved.

Each type is designed to economically meet some particular kind of service better than any other type; to provide electric-motor, steam, belt, oil-engine, or gas-engine drive. Some types are strictly air compressors; others handle gases of practically every description.

There are those for the permanent, stationary installation; stationary units incorporating features for easy relocation; and highly portable units for the transient job.

Each type is built in a complete range of sizes. In fact, the whole field of compressor needs, ranging from vacuums to 5,000 lbs. per sq. in. pressure and sizes from ¼ to 12,000 hp., is covered by the Ingersoll-Rand line.

When you need a compressor there is a 100 to 1 chance that you can choose a standard I-R machine or that Ingersoll-Rand has at some time or other built a unit to meet similar conditions. If your job is the exception, the combined experience of a trained engineering corps, employed by the largest compressor builder in the world, is ready to help you solve your problems.

The I-R line also includes air-operated tools, Cameron Pumps, Diesels, Condensers and Refrigerating Units.

Ingersoll-Rand

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